University of Alberta

The Impact of Hospital Nurse Specialty Subcultures on Nurse and Patient Outcomes

by

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To my parents, Athanasios and Eleni, who both passed away during my doctoral studies

and

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Chapter 1
Introduction

The story of the blind men and the elephant is well known. Seven blind men encounter an elephant for the first time. They arrange themselves in a circle around the elephant, and then each steps forward and feels a different part of the elephant. After this, each person believes they know what an elephant looks like. Yet, not one of them has an accurate picture of the whole elephant.[237] This story can be used to illustrate the state of the knowledge about organizational culture. Like an elephant, the mosaic that reflects the identity of organizational culture cannot be identified by its component parts. Nevertheless, as suggested by Schein[228], the concept is important because of its potential impact on organizational effectiveness in all areas including the provision of health services.

Having been involved in nursing administration at Penteli Children's Hospital in Athens, Greece, for more than 18 years, I had the opportunity to observe that different work environments in nursing units appear to provide different levels of nurse and patient outcomes. This experience led me to believe that work environments can greatly influence nurse job satisfaction and subsequently patient care. Later, as a doctoral student, I had the opportunity to work with an international and interdisciplinary study team investigating the impact of hospital restructuring on nurse and patient outcomes[10,253] and to attend a course on organizational change. Both of these experiences awakened my interest in work environments and, in particular, the concept of organizational culture. This dissertation following from these nursing experiences explores the concept of organizational culture and its impact on patient outcomes.

Problem Identification and Significance

In the last few decades, there has been a surge of research activity around the general concept of hospital work environments and their impact on an array of nurse and patient outcomes. This heightened research activity has been precipitated by a number of events and interests, including the following: (1) the accumulation of research evidence that different work environments can lead to both positive and negative nurse and patient outcomes; (2) Economic pressures exerted by governments to reduce the costs of hospital operations and the corresponding alterations in work environments by health authorities to meet the reduced costs; and (3) Enhanced public knowledge and interest in quality of care and accountability and the corresponding movement among nurses and physicians to establish evidence based standards of practice. In short, there appears to be a common desire by all to identify the incremental and causal effects of specified changes in work environments on certain provider and patient outcomes.

Why is it so important to study organizational culture? Schein[228] suggested that organizational culture is important because it not only describes the structural and process characteristics of a working environment, but also examines the values, beliefs, and assumptions of this practice environment. Today, organizations are confronted with several complex issues relevant to organizational achievements and better outcomes. Understanding, analyzing, and evaluating organizational culture is key for successfully

implementing new strategies and for reducing resistance to change. Further, working environments shape behaviors that influence actions, practices, and outcomes. Studying and understanding organizational culture can help organizations to apply the desired behaviors.

Studying culture is also important to nursing for at least two reasons.[124] First, the general concept of culture is important in human interactions and, thus, it is necessary for nurses to understand and interpret its meaning, especially from patient perspectives, in order to provide care based on their patients' sociocultural context. Second, organizational culture has an impact on behaviors and nursing practices and, thus, nurses should understand it and be aware of the effects of their practice environment on nurse and patient outcomes.

From a research perspective, there are at least four critical challenges to meeting such a goal. First, there is the lack of conceptual clarity and agreement among researchers regarding the concept of work environment, with a variety of terms having been used to describe the concept. The most common among those terms are practice/work environment, organizational characteristics, organizational culture, and climate. Second, the unit of analysis (the cultural group) in studies of organizational culture makes for various research complications. Organizations consist of subgroups that have specific characteristics and a sense of identification. In an organization, different subcultures may be nested in or indiscernible from the dominant culture that exists at the organizational level. Recognizing the cultural unit is essential to identifying and understanding organizational culture. Third, there are measurement issues related to both organizational culture and nurse/patient outcomes. Finally, the causal mechanisms that account for the association between work environment and nurse and patient outcomes have not yet been adequately explored.

This study was designed to shed light upon two of the above stated problems. First, I explored the concept of organizational culture and subcultures in hospitals, and developed a model depicting the relationships between organizational culture / nurse specialty subcultures (NSSCs), and nurse and patient outcomes. Second, with a series of structural equation models, I endeavored to test causal relationships and mechanisms between cultural manifestations, and selected nurse and patient outcomes. These causal relationships and mechanisms need to be clarified so that policies can be developed to reduce the risk of adverse patient events and enhance patient safety in hospitals.

Purpose of the Study and Objectives

The purpose of this study was to expand understanding of organizational culture, find evidence of the existence of nurse specialty subcultures within hospitals, and identify nurse specialty subcultures' impact on nurse and patient outcomes by testing the causal mechanisms involved. The primary objective was to test the relationships between organizational culture / nurse specialty subcultures and patient adverse outcomes in acute care hospitals in Alberta. A series of structural equation models (SEM) were assessed using LISREL on secondary data obtained through survey questionnaires in an attempt to generate, based on tentative theories, a model that best fits the data. The secondary objectives of the study were to determine whether nurse specialty subcultures exist in

hospitals and, if so, how they differentially affect job satisfaction, quality of care, and adverse patient occurrences.

Research Questions

The primary research question was, "How do organizational culture / nurse specialty subcultures affect nurse and patient outcomes in acute care hospitals in Alberta?" A secondary research question, which had to be addressed first, was, "Do nurse specialty subcultures exist within acute care hospitals in Alberta?"

Organizational Approach

Organizational culture has been studied from the point of view of several different scientific fields (e.g., anthropology, sociology) and is also of interest to organizational researchers. Each scientific field uses a different language, theories, and methodologies to describe what appear to be similar phenomena of culture. While nurses are well acquainted with the language of culture as interpreted in anthropology,[167,168] neither anthropological nor sociological theories or languages were used in this study. Instead, I selected to use the language of organizational researchers to study culture with a sociological approach.[21,80,81,104,184,224,251,276,283] In particular, I have drawn from Martin's[182] framework, which described three theoretical perspectives for studying organizational culture (i.e., integration, differentiation, and fragmentation). Specifically, I focused on the differentiation perspective, which refers to the nested subcultures within organizations. Martin[182] argued that there is not simply one "organizational culture" but rather a set of "cultures of an organization". The differentiation theoretical perspective refers to the existence of subcultures within organizations. Martin identified three criteria for distinguishing among the three theoretical perspectives: a) orientation to consensus, b) consistency among cultural manifestations, and c) orientation to ambiguity. From the differentiation perspective, based on these criteria, consensus occurs within subcultures, cultural manifestations have inconsistent interpretations, and "subcultures are like islands of clarity within a sea of ambiguity"[182].

This study crosses disciplines and refers to both nursing research and to sociological research. To nursing, because I explored nurses' perceptions relevant to their specialty subcultures and investigated the effects of nurse specialty subcultures on nurse and patient outcomes. To sociology, because I studied cultural informal practices referring to interactions among individuals in their everyday work life. After all,

> *"Sociology is the study of social life, social change, and the social causes and consequences of human behavior. Sociologists investigate the structure of groups, organizations, and societies, and how people interact within these contexts. Since all human behavior is social, the subject matter of sociology ranges from the intimate family to the hostile mob; from organized crime to religious cults; from the divisions of race, gender and social class to the shared beliefs of a common culture; and from the sociology of work to the sociology of sports. In fact, few fields have such broad scope and relevance for research, theory, and application of knowledge...."*[12]

Further, organizational sociologists are engaged in investigations of management styles that increase productivity and worker satisfaction, which is also an issue investigated in this study. However, leadership as a manager's tool is not included here, since I studied nurse specialty, not nursing unit, subcultures. My interests were descriptive, even though, as Martin argued,[182] it is difficult to study culture from a neutral position. Descriptive interests are such that researchers are not interested in managers' perspectives and/or their approaches, skills, and knowledge, but rather attempt to describe organizational culture and understand it.

Limitations and Strengths of the Study

A full discussion of the limitations is contained in Chapter 7. Nevertheless, I wish to bring to the reader's attention two of the most important limitations: they relate to the data collection instrument and the statistical analysis. By discussing them here, I hope to keep the reader apprised as to the level of confidence that can be placed in the findings of this study. In the same manner, I have included some of the strengths of the study that relate as well to the data collection instrument and the statistical analysis.

1. The NWI as a Cultural Tool

There are several ways of measuring organizational culture. For example, Scott et al.[239] and Gershon et al.[107] using slightly different databases identified nine and twelve instruments respectively that have been used to measure organizational culture in the healthcare sector. Only two instruments were common among both reviewers, suggesting that at least nineteen different instruments have been used to measure organizational culture. It is interesting to note that Gershon et al.[107] identified the Revised Nursing Work Index (NWI-R), the instrument used in this study, not as an instrument that measures organizational culture, but one that measures organizational climate. In this study, I used the NWI-R and the Maslach Burnout Inventory (MBI)[187] as instruments to assess organizational culture. I would argue that the NWI measures organizational culture, since it has its roots in magnet hospital studies and can be traced further back still to the work of Peters and Waterman.[216] Their study on organizational cultures of excellence described eight* characteristics present in these organizations. Drawing on the Peters and Waterman study, McClure[188] and Kramer & Schmalenberg[153] examined the characteristics of excellence within hospitals and concluded that six§ of them were present in magnet hospitals. Thus, it appears that the NWI originated from studies of (and it is essentially measuring) hospital organizational culture, even though several nurse researchers have used it in reference to organizational climate.[53,54,107] As is evident in the Chapter 2, organizational climate and organizational culture have been largely used interchangeably.

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* These eight characteristics were: 1) a bias for action, for getting on with it; 2) close to the customer; 3) autonomy and entrepreneurship; 4) productivity through people; 5) hands-on, value driven; 6) stick to the knitting; 7) simple form, lean staff; and 8) simultaneous loose-tight properties.[216]

§ These characteristics include: a) flattening of management layers; b) altering the makeup of the care delivery team; c) cross-training to provide multi-skilled personnel; d) decentralizing services to the unit or patient room level; e) architecturally reconfiguring the physical environment; and f) augmenting information technology to enhance patient care and documentation.[119]

In summary, I cite the use of the NWI as a limitation in this study as it appears that it has never been used to measure organizational culture. On the other hand, at least one publication refers to the NWI as an instrument that measures organizational climate.[107]

2. Structural Equation Modeling

Structural equation modeling may not be well accepted by cultural investigators as the best way to analyze organizational culture data, since their study approaches are largely qualitative. Further, cultural investigators tend to focus on the broad picture of organizational culture. However, I firmly believe that structural equation modeling is the best way to develop and test a theory of organizational culture. As a practice discipline, nursing needs theories in order to expand its knowledge of nursing phenomena. Overall, structural equation modeling may well be a strength given its ability to test causal relationships.

Summary

Although organizational culture has frequently been studied and identified as an important factor in the area of work life and performance, the concept has not been studied in the healthcare field. Nor have the effects of organizational culture on provider and patient outcomes been fully examined. In view of this knowledge gap, this study was undertaken in order to examine the impact of nurse specialty subcultures on selected nurse and patient outcomes. The two main limitations described above turn to be strengths of this study as I discuss later in.

Chapter 2
Literature Review

Organizational culture and in particular, nursing subcultures within hospitals, is the primary focus of this study and thus a major focus of this chapter. However, prior to the presentation of the critical review of the literature on nursing subcultures, I provide some background relevant to the general concept of organizational culture and outline the essential components of Martin's[182] framework. Next, I theorize on organizational subcultures in general and in the healthcare sector in particular, and describe the process to locate the literature focusing on nurse subcultures. The chapter concludes with a critical review of the research on nursing subcultures, culminating with a summary of the major research findings, conclusions and implications.

Background on Organizational Culture

The concept of organizational culture was popularized in the early 1980s. However, its roots can be traced back to the 1940s, when organizational culture drew its inspiration from earlier anthropological and sociological work on culture. Investigators of organizational culture largely viewed informal human relationships and non-material aspects of organizational life as more important than the formal and material ones.[194,293] It is of interest to note that in the management literature, the word *culture* was used for the first time by Professor Elliot Jaques in his 1951 book titled "The changing culture of a factory" (as cited in Hofstede[123]).

In the 1960s and 1970s, cultural researchers shifted their attention to more measurable aspects of organizational culture, such as employees' attitudes and perceptions, in what are referred to as *organizational climate* studies.[172,236] In the late 1970s, researchers showed renewed interest in organizational culture but in such a way as to suggest a deeper, more complex anthropological approach to cultural studies, aimed at understanding crucial and mostly invisible aspects of organizational life. Three seminal books published in the early 1980s triggered a business approach to the study of organizational culture, with a focus on improving the work life and performance of employees.[75,214,216] The industry concept of organizational culture generated a plethora of literature that was not only enormously popular but also contributed to new insights about the importance, role, and effects of organizational culture. In addition to the prior approaches to studying culture, researchers also viewed organizational culture as a manipulable and manageable asset of organizations. By the 1990s, a mass of organizational studies referred to the concept of organizational culture, with many of these studies postulating the notion that organizational culture plays a significant role in the overall effectiveness and performance of organizations.

Interestingly, however, this research has not extended into the area of organizational culture in the healthcare sector. Moreover, the organizational culture literature poses several challenges. For example, a great variety of theoretical and operational definitions of organizational culture are in use, resulting in inconsistent and sometimes incompatible definitions across streams of research. Investigators use a variety of terms (e.g., climate, practice environment) to represent similar or identical organizational phenomena[82,250] and

a variety of epistemological approaches in studying organizational culture.[114,251]

Martin's Framework

The organizational culture literature provides a variety of definitions, mainly varying in their focus (e.g., climate, etc.) and epistemological stance. Recently, Martin[17], in her influential review of organizational research relating to culture, attempted to "map the terrain". In critically classifying the literature on organizational culture studies, Martin identified several: *conceptualizations* of organizational culture (i.e., as a metaphor/context, variable); *perspectives* (i.e., integration, differentiation, fragmentation); researchers' *interests* (i.e., managerial, anti-managerial/critical, value-neutral/descriptive); and cultural *manifestations* (i.e., ideational, material)[17]. The following represents an overview of the literature related to organizational culture according to Martin's framework.

Conceptualizations

Organizational culture has been studied as a metaphor or as a variable. These different conceptualizations of culture have been defined in various ways, depending on the discipline the researcher comes from (e.g., anthropology, psychology, or sociology).

Culture as a Metaphor

Organizational culture as a metaphor examines a sympolic approach of organizational life. Several authors, primarily in the field of organizational studies, have studied organizational culture as a metaphor[12,13,14,21,22,23,24,25,26,27,28,29,30,31,32] and focused on the symbolic meanings of cultural forms.[1,35,36] Organizational culture as a metaphor has been defined as a homogeneous cultural context in which systems contain subsystems and the organizations contain a great diversity of groups of different professionals and units (subcultures) within them. These units may have independent or even conflicting cultures.[14,24,32]

In describing organizational culture as context, three different levels need to be taken into account: a) the observable artifacts that are palpable, but difficult to interpret; b) values (how things ought to be) and beliefs (how things are); and c) the basic underlying assumptions at a deeper level. These assumptions, which are implicit or taken-for-granted beliefs about how things operate, based on experience,[23] thoughts, and feelings, are difficult to interpret.[24] Norms, values, and beliefs create assumptions and, finally, culture. The essence of culture is the integration of all these elements into a larger paradigm that ties them together.[23] Culture is "a stabilizer, a conservative force, a key to making things predictable."[23] It is the final result of a complex group learning process, "a shared common learning output"[24] that "reproduces itself through the socialization of new members entering the group."[23] Culture evolves and grows due to the mutability of human nature and the interaction of individuals, but, for the purposes of studies of organizational culture, does not refer to sophistication, customs and rituals, climate and practices, values and credo.[23]

Golden[14] defined culture as a system of symbols that is historically developed and socially maintained (but not necessarily shared). It is a context where individuals are

active agents. The context prepares individuals to take or not take certain actions and interprets the meaning of action, but does not cause individual actions. Feldman[12] defined culture as a contextual force, as a systematic management of symbols, and as the interrelationships between an organization's members. Any culture-as-context shapes an organization in a certain form and leads to a specific framework of possible actions that attempt change, instead of being an obstacle to change. The system of symbolic forms – such as memories, goals, plans, ideas, roles, jokes, traditions, and group relations, to name a few – needs explication in terms of specific actions in a certain context. The essential dynamic of culture is the process of forming stable structures of meaning and the traditional moral standards for maintaining ethical distinctions between right and wrong.[12]

Culture as a Variable

Martin[17] described the approach of organizational culture as a variable as a functionalist viewpoint. Researchers in both the nursing and organizational studies literatures have studied organizational culture as a variable with practical utility (e.g., a tool or internal control mechanism)[4] that affects organization outcomes (e.g., performance and effectiveness)[4,2,3, 6,6 16,18,19,43] and/or for changing organization culture.[2,3,4,5,18] Additionally, organizational culture has been studied as a helpful instrument for making decisions (e.g., on hiring personnel, oriented newcomers and promoting learning)[4], understanding and changing employees' behavior (root metaphor)[20,43], and empowering nurses[18]. A number of researchers investigated organizational culture for studying conflicts between groups and individuals' contribution in nursing unit culture[37,37 38,39,40,41] and for examining the relationships between organization culture and organization commitment and readiness[15], and between subcultures and dominant culture[42].

Denison in his multiple publications about organizational culture[6,10,9,7,8,11] refers to culture/climate as a variable that affects organizational outcomes/ performance. Moreover, he attempts to present the similarities and differences between the concepts of culture and climate[7]. He argued that 'culture' and climate are the same phenomenon in an organization from a different perspective[7]. His preferable definition of culture is that it is an integral part of adaptation process in organization and one of the primary means that links social organizations with their environments[9].

Organizational culture as a variable is highly debated. The authors who prefer to study organizational culture as a variable[10,9,8] rely heavily on the use of quantitative methods (e.g., questionnaire survey), but sometimes integrate qualitative methods such as case studies, employee interviews, and so on. The triangulation of the data analyses is believed[33,34] to be the most rich analysis in understanding and predicting organizational life, processes, and outcomes.

Perspectives

Mapping findings, which, as Meleis[197] argued, is a means of understanding the differences among theoretical perspectives, "is a strategy to integrate massive amounts of knowledge by linking multiple variables and considering these variables from within multiple contexts" (p.236). Martin[182] followed several steps in developing her theory.

First, she reviewed the relevant literature, findings, and disputes. Then, she described different ontological and epistemological approaches, and the ways in which the nature of reality was conceived. Third, she identified the major philosophical and theoretical issues, categorized findings relevant to the research questions, and determined the major concepts found in the literature, and their patterns and themes. Finally, Martin[181,182] identified the three dominant social scientific (theoretical) perspectives represented in cultural studies: integration, differentiation, and fragmentation perspective. She argued that cultures do not have an objective reality that can be accurately observed, assessed, and described. Rather, each perspective represents the researchers' own subjective, interpretive, and evaluative framework. The distinctions between Martin's three perspectives, which are described next, are based on three criteria: a) orientation to consensus, b) relation among cultural manifestations (consistency), and c) orientation to ambiguity.

The *integration perspective* focuses on a shared organization-wide consensus where cultural manifestations are interpreted consistently. Ambiguity is excluded, and thus cultural clarity is implied. A metaphor that describes the integration perspective is that organizational culture is a "solid monolith" or "hologram" seen the same way by most cultural members regardless of their point of view. The unit of analysis is the organization. Table 2.1 identifies representative nursing studies adopting this perspective.

The *differentiation perspective* focuses on organizations as multicultural entities in which subcultures (the unit of analysis) are nested and consensus occurs only within subcultures. Cultural manifestations are not consistently interpreted. Ambiguity is channeled outside the boundaries of and between subcultures, while clarity exists within subcultures. Subcultures coexist and interact in harmony, in conflict with each other, or independently. A metaphor that describes the differentiation perspective is that "subcultures are like islands of clarity in a sea of ambiguity."[181] Table 2.1 identifies representative nursing studies adopting this perspective. Martin[182] also classified cultural studies from the differentiation perspective into five categories, based on their exploration or description of (1) *inconsistent interpretations* of cultural manifestations ('loose coupling'); (2) *differences* among subcultures, an issue sometimes neglected; (3) *subcultures within the boundaries of a collectivity* such as occupational, horizontal (functional), and vertical (hierarchical); (4) *relationships* among subcultures that may be mutually enhancing, conflicting, or independent; and (5) a *single subculture* (integration at a lower level). Table 2.2 illustrates representative nursing studies from the differentiation perspective that classified in these five categories.

The *fragmentation perspective* focuses on organizations in which consensus among cultural members does not exist. Cultural manifestations are interpreted as neither consistent nor inconsistent. Ambiguity not only is acknowledged, but is considered the very essence of culture. A metaphor that describes the fragmentation perspective is a "jungle" or "web" of individual cultural members with no consistent pattern but rather in constant flux. The unit of analysis is the individual. None of the nursing studies found in the literature was representative of this perspective.

Table 2.1 – Hospital Based Studies Employing Martin's Integration and Differentiation Perspectives

	Integration Perspective		Differentiation Perspective
1	Aurelio, 1993	Martin, 1988*	Avallone & Gibbon, 1998
2	Aurelio, 1995	McDaniel, 1995	Brooks & MacDonald, 2000
3	Beil-Hildebrand, 2002	Mok & Yeung, 2002	Brooks & Brown, 2002
4	Benko & Sarvimaki, 1999	Moore, 1998*	Coeling & Wilcox, 1988
5	Blouin, 1994*	Morrison, 1998	Coeling & Wilcox, 1990
6	Bond & Fiedler, 1999	Prater, 1993*	Coeling & Simms, 1993b
7	Brown & Brooks, 2002	Roussel, 1990*	Degeling, Kennedy, Hill, Carnegie, & Holt, 1998
8	Cameron & Wren, 1999	Shortell et al., 2000	Degeling, Sage, Kennedy, Perkins, & Zhang, 1999
9	Chaboyer, Najman, & Dunn, 2001	Shortell et al., 1998?	Degeling, Hill, Kennedy, Coyle, & Maxwell, 2000
10	Clarke, Sloane, & Aiken, 2002	Smith, 1991	Degeling, Kennedy, & Hill, 2001
11	Curran & Miller, 1990	Stichler, 1990*	Fleeger, 1993
12	Davis, 1989*	Stiefel, 1996*	Gifford, Zammuto, & Goodman, 2002
13	Davis, 2000	Stratton, 1990*	Kinnunen, 1990
14	Fleischer, 1994*	Stumpf, 1995*	Kotarba, Ragsdale, & Morrow, 1997
15	Foley, Kee, Minick, Harvey, & Jennings, 2002	Tonuma & Winbolt, 2000	Kratina, 1990*
16	Gillies, Franklin, & Child, 1990	Tzeng, Ketefian, & Redman, 2002	Lageson, 2001*
17	Hageman, 1990*	Upenieks, 2002	Laine-Timmerman, 1999*
18	Havens, 2001	Urden, 1999	Llorens, 1989*
19	Holland, 1993	Vandenberghe, 1999	McDaniel & Stumpf, 1993
20	Jones, 2003		Rizzo, Gilman, & Mersmann, 1994
21	Jones, 2000*		Seago, 1995*
22	Kane, 2000*		Seago, 1996a
23	Kangas, Kee, & McKee-Waddle, 1999		Seago, 2000
24	Keuter, Byrne, Voell, & Larson, 2000		Steinman, 1989*
25	Kinsella, 1991*		Thomas, 1992
26	Klakovich, 1995*		Thomas, 1993*
27	Langan-Fox & Tan, 1997		Tzeng, 1997*
28	Levinson, Graves, & Holcombe, 1984		Wilson, 1989*
29	Littell, 1995*		Woods, 1994
30	Manley, 2000a		Wright, 1992*
31	Manley, 2000b		Zimmerman et al., 1993

*Doctoral dissertation

Table 2.2 – Hospital Based Studies* Employing the Differentiation Perspective Based on Martin's Five Categories**

	1	2	3	4	5
1	None	Avallone & Gibbon, 1998	Kratina, 1990***	Brooks & MacDonald, 2000	Laine-Timmerman, 1999***
2		Brooks & Brown, 2002	Steinman, 1989***	Fleeger, 1993	
3		Coeling & Wilcox, 1988	Thomas, 1993***	McDaniel & Stumpf, 1993	
4		Coeling & Wilcox, 1990		Wright, 1992***	
5		Coeling & Simms, 1993b			
6		Degeling, Kennedy, Hill, Carnegie, & Holt, 1998			
7		Degeling, Sage, Kennedy, Perkins, & Zhang, 1999			
8		Degeling, Hill, Kennedy, Coyle, & Maxwell, 2000			
9		Degeling, Kennedy, & Hill, 2001			
10		Gifford, Zammuto, & Goodman, 2002			
11		Kinnunen, 1990			
12		Kotarba, Ragsdale, & Morrow, 1997			
13		Lageson, 2001***			
14		Llorens, 1989***			
15		Rizzo, Gilman, & Mersmann, 1994			
16		Seago, 1995***			
17		Seago, 1996a			
18		Seago, 2000			
19		Thomas, 1992			
20		Tzeng, 1997***			
21		Wilson, 1989***			
22		Woods, 1994			
23		Zimmerman et al., 1993			

*N=31

**1. Studies that examine *inconsistent interpretations* of cultural manifestations ('loose coupling').
2. Studies that examine cultural *differences* among subcultures.
3. Studies that refer to a broad range of *subcultures within the boundaries of a collectivity* (e.g., hospital).
4. Studies that describe *relationships* among subcultures that may be mutually enhancing, conflicting, or independent.
5. Studies that investigate a *single subculture* (integration at lower level).

***Doctoral dissertation (n=11)

Chapter 1
Introduction

The story of the blind men and the elephant is well known. Seven blind men encounter an elephant for the first time. They arrange themselves in a circle around the elephant, and then each steps forward and feels a different part of the elephant. After this, each person believes they know what an elephant looks like. Yet, not one of them has an accurate picture of the whole elephant.[237] This story can be used to illustrate the state of the knowledge about organizational culture. Like an elephant, the mosaic that reflects the identity of organizational culture cannot be identified by its component parts. Nevertheless, as suggested by Schein[228], the concept is important because of its potential impact on organizational effectiveness in all areas including the provision of health services.

Having been involved in nursing administration at Penteli Children's Hospital in Athens, Greece, for more than 18 years, I had the opportunity to observe that different work environments in nursing units appear to provide different levels of nurse and patient outcomes. This experience led me to believe that work environments can greatly influence nurse job satisfaction and subsequently patient care. Later, as a doctoral student, I had the opportunity to work with an international and interdisciplinary study team investigating the impact of hospital restructuring on nurse and patient outcomes[10,253] and to attend a course on organizational change. Both of these experiences awakened my interest in work environments and, in particular, the concept of organizational culture. This dissertation following from these nursing experiences explores the concept of organizational culture and its impact on patient outcomes.

Problem Identification and Significance

In the last few decades, there has been a surge of research activity around the general concept of hospital work environments and their impact on an array of nurse and patient outcomes. This heightened research activity has been precipitated by a number of events and interests, including the following: (1) the accumulation of research evidence that different work environments can lead to both positive and negative nurse and patient outcomes; (2) Economic pressures exerted by governments to reduce the costs of hospital operations and the corresponding alterations in work environments by health authorities to meet the reduced costs; and (3) Enhanced public knowledge and interest in quality of care and accountability and the corresponding movement among nurses and physicians to establish evidence based standards of practice. In short, there appears to be a common desire by all to identify the incremental and causal effects of specified changes in work environments on certain provider and patient outcomes.

Why is it so important to study organizational culture? Schein[228] suggested that organizational culture is important because it not only describes the structural and process characteristics of a working environment, but also examines the values, beliefs, and assumptions of this practice environment. Today, organizations are confronted with several complex issues relevant to organizational achievements and better outcomes. Understanding, analyzing, and evaluating organizational culture is key for successfully

Table 2.3 – Hospital Based Studies According to Martin's Framework

	Theoretical Perspectives		
Conceptualizations of OC*	**Integration**	**Differentiation**	**Fragmentation**
Metaphor	Aurelio, 1995[17] Beil-Hildebrand, 2002[25] Brown & Brooks, 2002[41] Cameron & Wren, 1999[46] Holland, 1993[125] Langan-Fox & Tan, 1997[160] Levinson et al., 1984[170] Manley, 2000a[177] Manley, 2000b[178] Roussel, 1990[222] Smith, 1991[252]	Avallone & Gibbon, 1998[19] Brooks & Brown, 2002[39] Brooks & MacDonald, 2000[40] Kotarba et al., 1997[146] Laine-Timmerman, 1999[159] Steinman, 1989[260]	None
Variable	Aurelio, 1993[16] Blouin, 1994[34] Bond & Fiedler, 1999[36] Chaboyer, Najman, & Dunn, 2001[49] Clarke, Sloane, & Aiken, 2002[54] Curran & Miller, 1990[69] Davis, 1989[71] Davis, 2000[72] Fleischer, 1994[100] Foley et al., 2002[101] Gillies, Franklin, & Child, 1990[109] Hageman, 1990[117] Havens, 2001[118] Jones, 2000[133] Jones, 2003[132] Kane, 2000[136] Kangas et al., 1999[137] Keuter et al., 2000[139] Kinsella, 1991[142] Klakovich, 1995[144] Littell, 1995[171] Martin, 1988[185] McDaniel, 1995[189] Mok & Yeung, 2002[204] Moore, 1998[205]	Coeling & Wilcox, 1988[60] Coeling & Wilcox, 1990[61] Coeling & Simms, 1993b[59] Degeling et al., 1998[78] Degeling et al., 1999[79] Degeling et al., 2000[76] Degeling, Kennedy, & Hill, 2001[77] Fleeger, 1993[99] Gifford et al., 2002[108] Kinnunen, 1990[141] Kratina, 1990[157] Lageson, 2001[158] McDaniel & Stumpf, 1993[190] Rizzo, Gilman, & Mersmann, 1994[221] Seago, 1995[241] Seago, 1996a[242] Seago, 2000[244] Thomas, 1992[271] Thomas, 1993[268] Tzeng, 1997[279] Wilson, 1989[296] Woods, 1994[297] Wright, 1992[299] Zimmerman et al., 1993[301]	None

	Morrison, 1998[207] Prater, 1993[218] Shortell et al., 1998[248] Shortell et al., 2000[247] Stichler, 1990[261] Stiefel, 1996[262] Stratton, 1990[263] Stumpf, 1995[264] Tonuma & Winbolt, 2000[274] Tzeng, Ketefian, & Redman, 2002[280] Upenieks, 2002[281] Urden, 1999[282] Vandenberghe, 1999[285]		
Cultural Researchers' Interests			
Managerial	Aurelio, 1993[16] Aurelio, 1995[17] Beil-Hildebrand, 2002[25] Blouin, 1994[34] Bond & Fiedler, 1999[36] Cameron & Wren, 1999[46] Clarke, Sloane, & Aiken, 2002[54] Curran & Miller, 1990[69] Davis, 1989[71] Davis, 2000[72] Fleischer, 1994[100] Foley et al., 2002[101] Gillies, Franklin, & Child, 1990[109] Hageman, 1990[117] Havens, 2001[118] Jones, 2000[133] Jones, 2003[132] Kane, 2000[136] Kangas et al., 1999[137] Keuter et al., 2000[139] Kinsella, 1991[142] Klakovich, 1995[144] Langan-Fox & Tan, 1997[160] Levinson et al., 1984[170] Littell, 1995[171] Manley, 2000a[177] Manley, 2000b[178]	Avallone & Gibbon, 1998[19] Brooks & Brown, 2002[39] Coeling & Wilcox, 1988[60] Coeling & Wilcox, 1990[61] Coeling & Simms, 1993b[59] Degeling et al., 1998[78] Degeling et al., 1999[79] Degeling, Kennedy, & Hill, 2001[77] Fleeger, 1993[99] Gifford et al., 2002[108] Kinnunen, 1990[141] Kratina, 1990[157] Lageson, 2001[158] McDaniel & Stumpf, 1993[190] Rizzo, Gilman, & Mersmann, 1994[221] Seago, 1995[241] Seago, 1996a[242] Seago, 2000[244] Thomas, 1992[271] Tzeng, 1997[279] Wilson, 1989[296] Woods, 1994[297] Wright, 1992[299] Zimmerman et al., 1993[301]	None

	Martin, 1988[185] McDaniel, 1995[189] Prater, 1993[218] Shortell et al., 2000[247] Morrison, 1998[207] Mok & Yeung, 2002[204] Moore, 1998[205] Roussel, 1990[222] Shortell et al., 1998[248] Stichler, 1990[261] Stiefel, 1996[262] Stratton, 1990[263] Stumpf, 1995[264] Tonuma & Winbolt, 2000[274] Tzeng, Ketefian, & Redman, 2002[280] Upenieks, 2002[281] Urden, 1999[282] Vandenberghe, 1999[285]		
Anti-managerial/Critical	None	None	None
Descriptive	Benko & Sarvimaki, 1999[26] Brown & Brooks, 2002[41] Chaboyer, Najman, & Dunn, 2001[49] Holland, 1993[125] Smith, 1991[252]	Brooks & MacDonald, 2000[40] Kotarba et al., 1997[146] Laine-Timmerman, 1999[159] Llorens, 1989[173] Steinman, 1989[260] Thomas, 1993[268]	

*OC: Organizational culture

Operational: Organizational culture consists of three components: cultural forms, practices (formal and informal), and content themes, which represent ideational and materialist cultural manifestations as aspects of organizational life.

1. Cultural forms (artifacts) refer to rituals, organizational stories, jargon, humor, and physical arrangements. They have traditionally been discarded as esoteric and hence as relatively trivial cultural manifestations.

2. Practices (formal and informal) have remained the primary focus of attention in cultural studies. They are defined as regularly occurring activities (or habits) involving beliefs or an accepted way of doing things (e.g., in an organization).

    a. *Formal practices* refer to written rules, such as formal hierarchical reporting structures, task and technology, rules and procedures, and financial schemes, all easily controlled by management. The financial schemes are the most important type of formal practices because they involve highly restricted kinds of information.

    b. *Informal practices* (behavioral norms) refer to unwritten guidelines that often take the form of social rules evolving through interaction. Informal practices, express employees' interpretations of the meaning of their surroundings may reveal inconsistencies with formal practices. Practices, both formal and informal, have been studied extensively, as they are highly meaningful and significant in understanding organizational culture.

3. Content themes, which can be categorized as either cognitive (beliefs or tacit assumptions) or attitudinal (values), underlie the interpretations of cultural manifestations. They can be expressed at various levels of abstraction, namely in terms of espoused and inferred values, and emotional concerns. Cultural studies can focus on one or more types of content themes. Sometimes, espoused and inferred values are inconsistent in the sense that espoused values are usually a superficial interpretation of manifestations. This superficiality functions to impress an audience, or to influence organizational reputation, such as through corporate propaganda representing the "core values" of an organization. On the other hand, inferred values, a deductive interpretation of cultural manifestations by researchers or employees, reflect a deep level of interpretation. Emotional concerns are inferred themes or job-related emotions referring to a deeper level of employees' interpretations of their work environment, interpretations reflecting basic assumptions.

<u>Cultural Manifestations</u>

Culture manifestations are divided into ideational/subjective interpretations (cognitive aspects of culture) and materialistic/objective interpretations (material aspects of culture), based on culture definitions and theoretical implications.[182] Ideational definitions of culture emphasize subjective interpretations conceptualized in terms of meanings or understandings. Material aspects of culture are described in objectivist terms, or their meanings are interpreted subjectively, facilitating discussion of inter-group conflicts. Materialist manifestations include the material conditions of work (e.g., carpet, noise, dirt

on an assembly line); size of employees' paychecks; the organization's hierarchy; and the way the work is organized, controlled, and carried out. There are two kinds of materialist approaches. First, definitions of culture including material and ideational aspects as manifestations of culture; and, second, definitions of culture as ideational interpretations (the cultural "superstructure"), which imply that it is important to study material conditions but that these are not part of culture (the structural "base"). Table 2.4 presents the types of cultural manifestations and representative examples in each category.

Table 2.4 – Representative Examples of Cultural Manifestations

Ideational					Material
Cultural Forms	Content Themes			Practices	
	Values		Emotional Concerns	Informal	Formal
	Espoused	Inferred			
Rituals	Corporate propaganda	Interpretation of cultural manifestations	Emotional exhaustion (EE)	Autonomy (Aut)	Salary
Jokes, humor				Control over practice (Con)	Continuing education (CE)
				Nurse-physician relations (RN-MD)	Quality assurance program (QAP)
					Preceptorship (Prec)

Theorizing Organizational Subcultures

Organizational culture is what individuals draw on to make sense of, and give meaning to, everyday life in organizations; it has also been shown to guide their behavior at work.[33,145,257] Similarly, Barley[21] noted that culture is maintained at the level of the group and acts to enable, constrain, and guide action at the level of the individual. Hofstede,[123] however, defined organizational culture as "the collective programming of the mind that distinguishes the members of one organization from another" (p.391), but he also recognized the existence of several (professional) subcultures within organizations. Van Maanen and Barley[283] described a professional (occupational) subculture as "a group of people who consider themselves to be engaged in the same sort of work; who identify (more or less positively) with their work; who share a set of values, norms and perspectives that apply to, but extend beyond, work related matters; and whose social relationships meld the realms of work and leisure" (p.295).

Subcultures

Health organizations in general, and hospitals in particular, consist of several subcultures such as professional/occupational, departmental, and several other (sometimes overlapping) subcultures[115,145,182]. Different subcultures nested within a hospital have

quite different social values, norms and assumptions (culture), which in turn, have significant consequences for patient care, quality of work life among providers, and organizational performance. Schein[228] argued that, usually, subcultures tend to form around areas of differentiation within organizations, such as functional units, geographical divisions, managerial hierarchy levels, and professional specialties. Moreover, numerous organizational researchers have pointed out the multicultural nature of organizations.[115,131,212,275] However, until Martin's[182] recent work, few have suggested ways to express subcultures in organizations conceptually.[105,198]

Professional Subcultures

One prominent group within healthcare organizations is that of professionals. Several authors describe professional culture, like organizational culture, as a set of cultural values and practices that a working individual holds. These consist of personal, professional, and organizational values that provide a framework to guide everyday practice.[121,145,257] Professional cultures are rarely replaced or absorbed into the dominant organizational (hospital) culture (except in professional organizations). Bloor and Dawson[33] argued that different professional subcultures can exist simultaneously and act as shapers of the overall organizational culture. Further, professional subcultures are not static but dynamic, developing and reflecting a complex interplay between cultural constituents of an organizational culture and the external environment. Types of organizations and the place of professionals within them determine the effect of organizational culture and professionalism upon each other. Knight and Saunders suggested that the term "professional culture" consists of two concepts: 'culture' and 'professional', both of which "are complex, ambiguous, and deeply embedded in consciousness and practice"[145]. Bloor and Dawson[33] argued that professional cultures are sometimes similar to organizational cultures since they exist within a historical context and professional environment. However, professional cultures are simultaneously fragmented and cohesive, untidy, inconsistent, and diverse, because people operate within many overlapping groups (e.g., ethnic, professional, departmental, and specialty). This makes it difficult to study professional cultures and subcultures that coexist in a single organization, but it is important to do so to get a better understanding of both the organization as a whole and its nested subcultures[145]. Understanding an organization's functionality is a worthwhile purpose in its own right and can help clarify a study's objective.

Professional Subcultures in the Healthcare Sector

Healthcare organizations also consist of subcultures. In one of the few books on organizational subcultures, Raelin[219] addresses the subcultures of managers and professionals in the 1970s and 1980s, referring amongst others to physicians, lawyers, nurses, and pharmacists. Eisenberg,[90] however, suggested that healthcare organizations are behind other sectors in understanding their own cultures. One of the gaps in the current knowledge of healthcare organizational cultures is as to "whether profession-specific subcultures exist within the culture of health care"[90]. Even though healthcare organizations are heavily dominated by and characterized by distinct professional subcultures, such as the medical and nursing subcultures, research on these subcultures is limited.

Professional subcultures (e.g., nursing, medical, managerial) may highlight the way in which respondents view hospital reform and their strategic stances in responding to changes in health policy.[76,79] They may also influence the differences between perspectives of clinical work performance. As Degeling et al.[77] found for example, each professional group's perspectives include the importance of institutional factors as causes of clinical practice variation, and autonomy as a factor for involvement in team-based clinical unit management. Kinnunen[141] argued that professional subcultures affect the social assumptions of work teams on development activities in health care organizations. Further, she found that in dissonant nursing subcultures various goals, motivations and conflicts existed between and within subcultures. As suggested by Fleeger[99], these differences affected management strategies for conflict resolution, staff development, and organizational change.

Nurse Professional Subcultures

Nursing professional subcultures are specifically developed through the basic educational and socialization processes of becoming a nurse, where certain values and beliefs associated with nursing are cultivated. The values and beliefs obtained from basic education are either further developed or abandoned upon employment.[150] Organizational culture, experiences in everyday practice (specifically in the unit), as well as socialization and interaction with other healthcare professionals, all influence the nurses' professional identity.

In nursing cultural studies, the most common unit of analysis is the nursing unit,[58,60,93,190,269] which is generally viewed as the smallest spatial unit. Nursing unit subcultures have physical boundaries, and it seems that nurses' perceptions of their practice environment are based on the same experiences, colleagues, supervisors, and the like within the same boundaries.[182] However, in each nursing unit, there are several other subcultures such as occupational (RNs, MDs, LPNs, clerk, housekeeping personnel, etc.), day/night shift, and so on that overlap each other. As Thomas[268] suggested, studying segments of an organizational culture (i.e., subcultures) is an appropriate way to understand the complexity of the organizational culture.

Retrieval of Literature on Nurse Subcultures in Hospitals

The purposes of the literature search were (1) to identify cultural studies in the healthcare sector from the differentiation perspective as defined by Martin,[182] (2) to determine the nature/categories of subcultures, and (3) to assess the effects of organizational subculture on nurse and patient outcomes. The research question that guided the literature review was, "What evidence is there of subcultures in hospitals that include nurses, and what effects do these subcultures have on nurse and/or patient outcomes?"

For this study, I drew on Martin[182] for the development of theoretical and operational definitions, and on her explication of the various perspectives used to study organizational culture. Specifically, my interest was in examining organizational culture from what Martin theoretically identifies as the differentiation perspective and in investigating that culture empirically in the study of nurse subcultures nested in hospitals.

This interest derives, first, from my experience as nurse manager in several nursing units, where different practice environments resulted in different outcomes, and, second, from the literature referring to nested subcultures as building blocks of organizational cultures. Even though the sum of the parts (subcultures) is smaller than the entire organizational culture, knowledge of subcultures is useful, important, and informative in order to understand the whole organization.

Keywords - Inclusion Criteria

In searching the literature, I used the term "nursing" and its synonyms, combined with the following descriptors (keywords): organizational culture, organizational climate, corporate culture, organizational characteristics, nursing culture, and nursing practice environment. Even though I was primarily interested in organizational culture, I also used other terms (e.g., climate, organizational characteristics, etc.) because researchers often use various terms such as social context, nursing practice environment or clinical practice environment to describe work culture.

Publications that addressed any hospital subcultures that referred to nurses were included. Based on the first criterion, each document had to refer to organizational culture or climate in the healthcare sector. Second, the publications were limited to those written in the English language. Third, the studied populations had to include nurses in hospitals and nursing units. Fourth, the publications were limited to research-based articles (quantitative and qualitative), dissertations, systematic/critical literature reviews, and important reports.

Search Strategies

I used Cooper's[65] recommended strategies to locate the literature of interest. These strategies included electronic and manual searches as well as the review of reference lists and classical documents (e.g., Schein's work[104,226,227,228,231,233]). The electronic search went back as far as the databases allowed (see below in parentheses for each database) and up to March 2004. The electronic databases included CINAHL (Cumulative Index of Nursing and Allied Health, 1982); EMBASE (1988); ERIC (1966); MEDLINE (1966); PsycINFO (1872); CDSR, ACP Journal Club, DARE, CCTR, AMED (Allied and Complementary Medicine, 1985); CANCERLIT (1975); HealthSTAR/Ovid Healthstar (1987); International Pharmaceutical Abstracts (1970); and Sociological Abstracts (1986).

The electronic search was accompanied by a manual search covering 1997-2004, a period beginning five years before I began writing the proposal of this study (2002) and ending in the year of completing the study (2004). I searched the following nursing journals because they were considered to be the most likely of the ten best nursing journals to include publications on organizational culture/subcultures in hospitals: Nursing Science Quarterly, Nursing Research, Qualitative Health Research, Nursing Outlook, Advances in Nursing Science, and Research in Nursing & Health. Even though the electronic search included these journals, the hand-search was used to identify any expressions or terms other than the keywords that may have been used in reference to organizational culture and subcultures. No new articles were retrieved as a result of the hand-search. I also

reviewed reference lists of key publications for articles that had not been identified through other sources. Additionally, I reviewed several key historical and classical publications relevant to organizational culture that represented a substantial contribution to the understanding of organizational culture.[104,181,183,228]

Literature Retrieved

In all, the keyword approach revealed 2,461 publications. I then examined the abstracts of these articles for possible inclusion in the critical review. When an abstract was not available, the publication was excluded. From these 2,461 publications, 256 non-duplicate documents met the selection criteria. A second-stage selection process was used to identify research that centered on the three theoretical perspectives that Martin[182] described (i.e., integration, differentiation, and fragmentation). Among these 256 publications, 50 studies were classified as representing the 'integration' theoretical perspective, 31 as representing the 'differentiation' theoretical perspective, and none as the 'fragmentation' perspective. The remaining 175 documents were literature reviews and reports (Table 2.5). I reviewed the 31 publications from the differentiation perspective that were published between 1988 and 2002, since I was interested in examining nurses' subcultures. These studies, consisting of 20 research articles and 11 doctoral dissertations, represented about 12% of the overall publications on organizational culture in hospitals (n=256). I further classified the 31 papers according to the five categories of the differentiation perspective (Table 2.2). It is interesting to note that none of these studies reported included any Canadian data.

The methodological quality of the research publications was critiqued based on a quality-rating tool published by Estabrooks et al.[92] Design, sample, measurement, and analysis were the areas of research that were critiqued (Table 2.6). Overall, the majority of the 31 papers (n=17) were based on quantitative research design (e.g., descriptive, correlation), while nine employed qualitative research methods (i.e., ethnographic, anthropologic, phenomenology) and the remaining 5 were a combination of quantitative and qualitative methods. The instruments employed to measure hospital organizational culture included the Organizational Culture Inventory (OCI)[63]; the Nursing Unit Cultural Assessment Tool (NUCAT)[58]; and the Work Environment Scale (WES).[206]

Cooke and Lafferty[63] developed the OCI and in their study of 18 organizations with 135 participants reported validity and Cronbach alpha reliability coefficients of the instrument ranged from 0.75 to 0.92. Similarly, McDaniel and Stumpf[190] reported a Cronbach alpha of 0.90 and they, also, mentioned that construct and content validity, and interrater and test-retest reliability were found to be acceptable. However, no data was provided. Coeling and Simms,[58] the developers of the NUCAT, established validity by describing behaviors using the correct name, which was done by asking nurses during both interviews and group discussions whether rules and behaviors were correctly described. Further, they pre-tested the validity of the NUCAT based on participant observation, think-tank discussions, and open-ended questionnaires. The authors determined reliability on the basis of whether the events of collecting data occurred on a repeated basis. However, no coefficients estimated reliability or validity were reported in their study publications. The reliability and validity of the NUCAT was also discussed in a work by

Irvine and Carroll based on the concept of construct validity. Seago[243] reported that the OCI has been widely used in many types of organizations and it has substantial data supporting the reliability and validity.[63,64,190] However, she mentioned it does not always capture variation in nursing units. In contrast, the NUCAT has less evidence on reliability and validity data, but researchers have reported wide variation among units. The reliability and validity of the WES was assessed by Moos[206] and standardized on North America populations. Avallone and Gibbon[19] reported that the WES has been used in several studies both in North America and the United Kingdom and assessed different nursing practice environments among nursing units and specialties. None of the papers reviewed reported any information on the reliability and validity of the WES.

In the majority of the quantitative papers, researchers analyzed the data using descriptive statistics, correlations, ANOVA, regression analysis, PCA, and discriminant analysis, while the qualitative researchers used content analysis. Of the 31 papers, only four did not meet the criteria of good quality (three doctoral dissertations[159,260,296] and an article[99]), largely due to the lack of published information. However, given the paucity of the literature, these four studies were included in the critical review, but they did not influence the conclusions.

Table 2.5 – Source and Number of Hospital Based Studies Identified and Reviewed According to Keywords* and Inclusion Criteria**

Source (electronic databases)	**Number of publications revealed**
AMED (from 1985) CANCERLIT (from 1975) CDSR, ACP Journal Club, DARE, CCTR CINAHL (from 1982) EMBASE (from 1988) ERIC (from 1966) HealthSTAR/Ovid Healthstar (from 1987) International Pharmaceutical Abstracts (from 1970) MEDLINE (from 1966) PsycINFO (from 1872)	2,308
Sociological Abstracts (from 1986)	27
ABI Inform (from 1986)	126
Publications based on keywords	**2,461*** **
Non-duplicate articles based on the inclusion criteria	**256**

*** Keywords:** nursing + organizational culture, organizational climate, nursing culture, nursing practice environment, corporate culture, organizational characteristics.

**** Inclusion criteria:** 1) English language, 2) hospital, 3) nurses, 4) research articles & literature reviews and reports.

***This total reflects over-representation as many articles were cited in more than one database (double/triple citations).

Table 2.6 - Characteristics of Hospital Based Studies Employing the Differentiation Perspective

	Citation/Source	Design	Sample	Measurement	Analysis
1	Avallone & Gibbon, 1998	Descriptive	3 NDUs - 70 RNs	Work Environment Scale (WES)	Descriptive statistics
2	Brooks & Brown, 2002	Phenomenology	The Chief Executive, 4 board members, 3 consultants, the director of nursing, 10 middle managers, 8 junior non-medical & non-managerial employees	Ritualistic ceremonies (semi-structured interview & observation)	Content analysis
3	Brooks & MacDonald, 2000	Exploratory ethnography	19 permanent night shift nurses, 12 permanent day shift nurses	Night shift subculture (interviews & observation)	Content analysis
4	Coeling & Wilcox, 1988	Anthropologic, ethnographic	2 medical/surgical units (urology-renal, oncology), 35 participants (head nurses, staff nurses, unit clerks)	Culture, Behavior, Job satisfaction (participant observation, semi-structured interviews)	Content analysis
5	Coeling & Wilcox, 1990	Anthropologic, ethnographic	2 medical/surgical units (urology-renal, oncology), 35 participants (head nurses, staff nurses, unit clerks)	Culture, Behavior, Job satisfaction (participant observation, semi-structured interviews)	Content analysis
6	Coeling & Simms, 1993b	Descriptive	33 nursing units (i.e., medical, surgical, orthopedic, critical care, pediatric, psychiatric, rehabilitation, and outpatient), 607 participants (nursing personnel)	Nursing unit culture, behavior (Nursing Unit Cultural Assessment Tool - NUCAT)	Descriptive statistics

7	Degeling, Kennedy, Hill, Carnegie, & Holt, 1998	Cross-national	2 hospitals (Australia), 4 hospitals (UK), 850 respondents (nurse clinicians, nurse managers, medical clinicians, medical managers, lay managers)	Beliefs and perceptions (survey questionnaire) on hospital reform, evidence-based medicine, quality of care, and technical efficiency.	Rank of a set of items, Allocation of percentage points of nominated situations or conditions, Rate of nominated situations or conditions, Chi-square, ANOVA, PCA
8	Degeling, Sage, Kennedy, Perkins, & Zhang, 1999	Cross-national	3 hospitals (Australia) 2 hospitals (NZ), 790 respondents (nurse clinicians, nurse managers, medical clinicians, medical managers, lay managers)	Professional subcultures, Hospital reform	Correlations, PCA, Discriminant analysis, 2-way ANOVA
9	Degeling, Hill, Kennedy, Coyle, & Maxwell, 2000	Cross-national	2 hospitals (Australia), 4 hospitals (UK), 850 respondents (nurse clinicians, nurse managers, medical clinicians, medical managers, lay managers)	Professional subcultures, Hospital reform	Correlations, PCA, Discriminant analysis, 2-way ANOVA
10	Degeling, Kennedy, & Hill, 2001	Cross-national	2 hospitals (Australia), 4 hospitals (UK), 856 respondents (nurse clinicians, nurse managers, medical clinicians, medical managers, lay managers)	Beliefs and perceptions (survey questionnaire) on hospital reform, evidence-based medicine, quality of care, and technical efficiency.	PCA, Component analysis, 2-way ANOVA, Discriminant analysis
11	Fleeger, 1993	?	3 hospitals, 3 nursing units	RNs occupational culture (qualitative cultural assessment inventory), Nursing unit culture (organizational ideology – a 15-item questionnaire), Cultural change	?
12	Gifford, Zammuto, & Goodman, 2002	Correlational	32.8% of staff in 7 obstetrics units (from 7 urban hospitals in 5 western cities in US.	Organizational culture, Competing Values Framework CVF, Quality of work-life measures (QWL) on organizational commitment, job involvement, empowerment, job	ANOVA

				satisfaction, intent to turnover,	
13	Kinnunen, 1990	Anthropologic	25 interviews 700 questionnaires to all employees	Professional subcultures (nursing, medicine, management)	Content analysis
14	Kotarba, Ragsdale, & Morrow, 1997	Ethnography	AIDS unit - 4 RNs per unit	Cultural domains (observations & interviews)	Content analysis
15	Kratina, 1990*	Exploratory	4 hospitals (medical, surgical, & special care nursing units), 274 RNs, 25 Head Nurses	Organizational culture, job satisfaction, and leadership, turnover (anonymous survey)	Descriptive statistics, correlation, ANOVA
16	Lageson, 2001*	Descriptive, cross-sectional	23 hospitals - 53 nursing units	Organizational culture (OCI), Quality-mindedness (TQManager), Management leadership (Nurse-Physician Questionnaire, NPQ), Decision-making (NPQ), Communication (NPQ), Job satisfaction (McCloskey/Mueller Satisfaction Scale), Patient satisfaction (Quality of Care Monitor), Turnover, Unit effectiveness (NPQ), Staff perceptions of quality of care, Intent to leave (Ferris/Rowland Scale)	Pearson product moment correlations, simple, and multiple regression
17	Laine-Timmerman, 1999*	Qualitative	?	Emotions in floor nurses (participant-observation & in-depth interviews)	?
18	Llorens, 1989*	Cross-sectional	4 hospitals, 69 nurse managers (9 upper, 21 middle, and 39 lower level)	The Values Differences Survey questionnaire	Kruskal-Wallis, ANOVA, and Wilcoxon statistics
19	McDaniel & Stumpf, 1993	Cross-sectional, correlational	7 hospitals (4 large & 3 small), 209 nurses (164 staff RNs & 45 managers)	Organizational culture (OCI) Leadership (Multifactor Leadership Questionnaire), Job satisfaction (Work Satisfaction Scale)	Pearson correlations

20	Rizzo, Gilman, & Mersmann, 1994	Correlational	13 nursing units	NUCAT, Change redesign process	Correlations
21	Seago, 1995*	Descriptive correlational	67 nursing units - 622 RNs	Organizational culture (OCI), hostility, work stress, absenteeism, turnover	Descriptive statistics and Correlations
22	Seago, 1996a	Descriptive correlational	67 nursing units	Organizational culture (OCI), absenteeism, turnover	Descriptive statistics and Correlations
23	Seago, 2000	Cross-sectional	RNs & UAPs	Organizational culture (OCI)	Descriptive statistics and multiple regression
24	Steinman, 1989*	Ethnography	?	?	?
25	Thomas, 1992	Descriptive	9 nursing units (elderly) 12 RNs & 12 UAPs	Work Environment Scale WES	Descriptive statistics & content analysis
26	Thomas, 1993*	Correlational	2 hospitals, 6 nursing units, 2 hierarchical levels' nurse managers	Organizational culture (OCI), Job satisfaction (interviews & Index of Work Satisfaction questionnaire)	Correlations
27	Tzeng, 1997*	Comparative	1 hospital - 18 nursing units 129 RNs & 223 patients	Job satisfaction, quality of care, & patient satisfaction (survey & interviews)	Multiple regression, one-way ANOVA tests and cluster analyses
28	Wilson, 1989*	Descriptive	1 hospital - 2 nursing units	Work Environment Scale (WES), Job Description Index, innovation diffusion (interviews & surveys)	?
29	Wright, 1992*	Ex-post facto non-experimental, descriptive	1 teaching hospital, 2 nursing units, 165 RNs & LPNs, 133 med/surg inpatients	Patient satisfaction, Nursing unit climate, Patient length of stay (survey questionnaires)	Descriptive & correlations
30	Woods, 1994*	Ethnography		Patient care unit culture (participant observation & interviews) Nurse retention	Constant comparative method
31	Zimmerman et al., 1993	Prospective multi-center inception cohort	9 hospitals (5 teaching & 4 non-teaching); 9 ICUs (1 medical, 2 surgical, 6 medical-surgical); 3,672 ICU admissions; 316 nurses; & 202 physicians	Outcome data, structure and organization of units, hospital death rate, length of stay (survey, interviews, & observations)	Descriptive statistics

* Doctoral dissertation

Critical Review of the Literature on 31 publications

For the purpose of presentation, I have grouped the findings based on the purposes of the literature review: 1) results on the existence of hospital subcultures and their nature, 2) the effects of subcultures on nurse outcomes, and 3) the effects of subcultures on patient outcomes. Finally, I briefly describe organizational outcomes related to hospital culture and subcultures.

The Existence of Subcultures in Hospitals

The majority of the reviewed papers provided evidence for the presence of subcultures in hospitals. The cultural studies reviewed contained both theoretical[60] and empirical[58,241,242] evidence that subcultures do exist in healthcare organizations. Researchers in the healthcare sector identified various cultural sub-categories such as professional/occupational (e.g., nurses', physicians', managers', etc.),[76,77,78,79,99,141,173,244,271] specialty (e.g., medical, intensive care, etc.),[268] nursing unit,[59,60,61,146,157,221,241,242,268,296,299] and night shift subcultures.[40] However, the majority of subcultures studied in nursing refer to nursing unit subcultures with physical boundaries.[59,60,61,146,157,221,241,242,268,296,299] Specifically, Coeling and Simms,[57] who studied several nursing unit and specialty subcultures, argued that there was no unique pattern of culture to a given specialty. They concluded it is more likely to find similar nursing units between than within specialties. Finally, even though Wilson[296] in her doctoral dissertation described nursing unit subcultures within hospitals, she found no appreciable difference between these subcultures. This finding is cautionary as there was insufficient information to critique the research quality of her study.

Of the five categories of studying subcultures from the differentiation perspective (Table 2.5), the majority of the reviewed studies referred to the second category identified by Martin[182] namely "differences among subcultures". Seventeen research articles – representing fourteen studies – and six doctoral dissertations explored cultural differences among several subcultures in hospitals.[19,39,59,60,61,76,77,78,79,108,141,146,158,173,221,241,242,244,271,279,296,297,301] Not one study was found in the first category of the differentiation perspective (inconsistent interpretations of cultural manifestations). However, several investigators studied subcultures within the boundaries of a collectivity[157,260,268] and/or relationships among subcultures[40,99,190,299] (3rd and 4th categories respectively). Only one study[159] was found in which the researcher qualitatively explored a single nursing unit subculture within a hospital, describing the emotionality of floor nurses as a cultural manifestation (5th category).

The Effects of Subcultures on Nurse Outcomes

Job satisfaction and quality of work life were the predominant nurse outcomes studied in terms of how they were affected by hospital subcultures. However, the influence of hospital subcultures on nurse absenteeism, turnover, and hostility were also studied. Finally, nurses' emotionality was explored as a cultural manifestation. Nurse job satisfaction in a predominantly supportive unit culture was positively influenced by leader behaviors and associated with leadership skills, type of leadership, and communication.[157,158] Also, a constructive culture was positively correlated with all features of leadership ($r = 0.372$) and work satisfaction ($r = 0.354$).[190] Significant

predictor variables for job satisfaction were quality-mindedness (R^2 = .327), managerial leadership (R^2 = .414), and constructive culture (R^2 = .504).[158] Further, statistically significant correlations were identified between nurse job satisfaction and their perceived behavioral norms and expectations,[268] while staff nurses' perceptions of organization cultural manifestations predicted their job satisfaction.[279] Avallone and Gibbon[19] reported a marked difference in satisfaction with work environment among three nursing units they surveyed. This finding indicates that organizational culture/subcultures and human relations are associated and positively correlated with quality of work life (i.e., commitment, job involvement, empowerment, and job satisfaction).[108]

The nurse outcomes of absenteeism and turnover were also found to be influenced by hospital subcultures. Absenteeism had a significant negative correlation ($r = -0.268$, $p = 0.028$) with decision latitude within a constructive work group culture.[241] According to Seago,[241] nursing, as a high decision latitude/high psychological demand profession, involves limited job strain; hence, a nursing practice environment with greater decision latitude for staff members will also tend to be an environment with less absenteeism. Nurse turnover demonstrated a general relationship with type of unit culture, but not with leader behaviors.[108,157] In particular, turnover was lower in special care units, where nursing unit culture tended to be more innovative.[157] Similarly, in fairly constructive nursing unit cultures, staff retention was moderate.[190] Intention to leave was negatively associated with human relations.[108] Seago[241] found no statistically significant correlations between work group culture and job stress or between work group culture and turnover.

Hostility among subcultures is one of the phenomena described within hospitals. The evidence suggests that, in organizations, there are several subcultures, which may be in harmony, in conflict, or independent of one another.[242] In her doctoral research, Seago[241] found that when all nursing units within a hospital displayed a constructive work group culture, these units had a lower than average score for hostility. A major implication of these findings is that work group cultures in nursing units should maintain/create a constructive culture to minimize hostility levels among staff members. Further, positive correlations were found between psychological demands and both aggressive-defensive and passive-defensive cultures ($r=0.420$ and $r=0.564$, respectively, at $p < 0.001$), and between hostility and aggressive-defensive culture ($r=0.322$).[242] These findings indicate that nurses evoke hostile reactions from other cultural groups within hospitals. Nurses, being an almost exclusively female group within an organization numerically dominated by women, perceived their espoused values as "female" ways of being.[40]

Various emotions that nurses experience originate because they bring to their work a system of ideals, such as in regard to patient care, challenge, perfectionism, teamwork, and professionalism.[159] These ideals are in tension with one another and with nurses' actual experience of daily work life. They work in concert with specific catalysts, including coworkers, patients, physicians, and time constraints, to create feelings. Nurses' emotional experiences of enjoyment, frustration, sadness, and fear are complex, varied, blended, and change over time. It is not easy for nurses to express their emotions on the job, and so they tend to transcend cultural constraints on emotional expression by communicating feelings non-verbally. These emotions and their expression both affect

and reflect the broader cultures. At the same time, organizational culture and the profession shape nurses' self-perceptions and actions through their practices and values. These findings are based on Laine-Timmerman's doctoral dissertation[159] which was unavailable. Her abstract did not provide sufficient information to judge the validity of her findings.

Effects of Subcultures on Patient Outcomes

The patient outcome that was examined most often in association with hospital subcultures was patient satisfaction with provided nursing care, but overall quality of care was explored as well. Patient satisfaction was found to be associated with workload (average daily census), nurse job satisfaction, and organizational culture/subcultures. Average daily census was found to be a significant predictor for overall patient satisfaction ($R^2 = 0.301$) and satisfaction with nursing care ($R^2 = 0.372$), implying that as unit census increases, patients are less likely to be satisfied.[158] Nurse job satisfaction also affected patient satisfaction. Findings indicated that less satisfied nurses may negatively influence patient satisfaction.[158] Finally, organizational/nursing unit cultural factors predicted units' mean score in terms of patients' satisfaction with information on home care and follow-up, management of pain and discomfort, and nursing care.[279]

At several ICUs, quality of care was found to be associated with superior organizational practices. These cultural manifestations were related to a patient-centered culture, strong medical and nursing leadership, effective communication and coordination, and open, collaborative approaches to solving problems and managing conflict.[301] Unit effectiveness was significantly predicted by both managerial leadership and communication ($R^2 = 0.517$). Communication was also a significant predictor of staff perceptions of unit quality ($R^2 = 0.363$). Leadership skills and communication were related to overall unit functioning and perceptions of quality.[158] However, in another study, non-significant relationships were found between the nursing staff's perceptions of climate, patient satisfaction with nursing care, and length of hospital stay.[299]

Summary and Implications for Further Research

In summary, studies of nested subcultures within healthcare organizations (e.g., hospitals) are limited in the literature in the healthcare sector. However, a number of inferences can be drawn from the literature review. First, there is evidence that subcultures do exist in hospitals. The majority of researchers have adopted the integration perspective and defined culture as "shared" values and beliefs at the organizational level. Even though the evidence points to several overlapping subcultures within hospitals, there are limited indications that professional or specialty subcultures (beyond spatial boundaries) exist within hospitals. The limited evidence of specialty subcultures reflects the tendency of researchers to study subcultures with physical boundaries (e.g., nursing units). Specifically, when several nursing specialty subcultures with boundaries (i.e., specialty consisted of one nursing unit) were examined, the tendency would be to conclude that there was no unique pattern of culture to a given specialty.

Second, it is evident that organizational subcultures were correlated with outcomes (mainly nurse, but also patient outcomes), management strategies, and implementation of

innovations and change. The main nurse outcomes referred to were job satisfaction, quality of work life, absenteeism, turnover, and hostility. Patient outcomes, however, mainly referred to patient satisfaction and quality of care. Third, there was no description or development of theories on healthcare organizational subcultures, even though this approach is significant to a practice discipline like nursing; of relationships between subcultures and patient outcomes; or any description of causal influences or the degree of those influences on nurse and patient outcomes. Consequently, I developed a model of the impact of organizational (hospital) subcultures on outcomes. Specifically, I described and assessed nursing profession-based specialty subcultures (NSSCs) and their causal influence on nurse and patient outcomes. The purpose for developing and testing this model was twofold: first, to enhance understanding of nurse specialty subcultures, and, second, to test their causal relationships with nurse and patient outcomes.

Chapter 3
Theoretical Framework

The theoretical framework of this study is based on nurses' perceptions of their practice environment, especially the nursing specialty subcultures within which they work. There is little evidence that organizational culture/subcultures influence quality of care and adverse patient occurrences.[9,192,199,247,253] Further, a few studies address the development and testing of theories in this area of research. Based on the literature review in the previous chapter, I operationalized Martin's[182] differentiation perspective by focusing on hospital subcultures, instead of studying the entire hospital culture. The differentiation perspective is closely linked – via Martin's argument that organizations are multicultural entities – with subcultures nested in organizations. Consensus occurs only within the boundaries of subcultures, while ambiguity exists outside of and between subcultures. In light of these considerations, I developed a model based on Martin's differentiation perspective, which was suitable to my purposes for two reasons. First, I am interested in nested subcultures instead of the organizational culture. Second, since I am a secondary researcher, the only data available to me was on nurse specialties. This model deals with the impact of hospital nurse subcultures on adverse patient occurrences. Hereafter, I will use the term 'model', thus also implying the theory behind it.

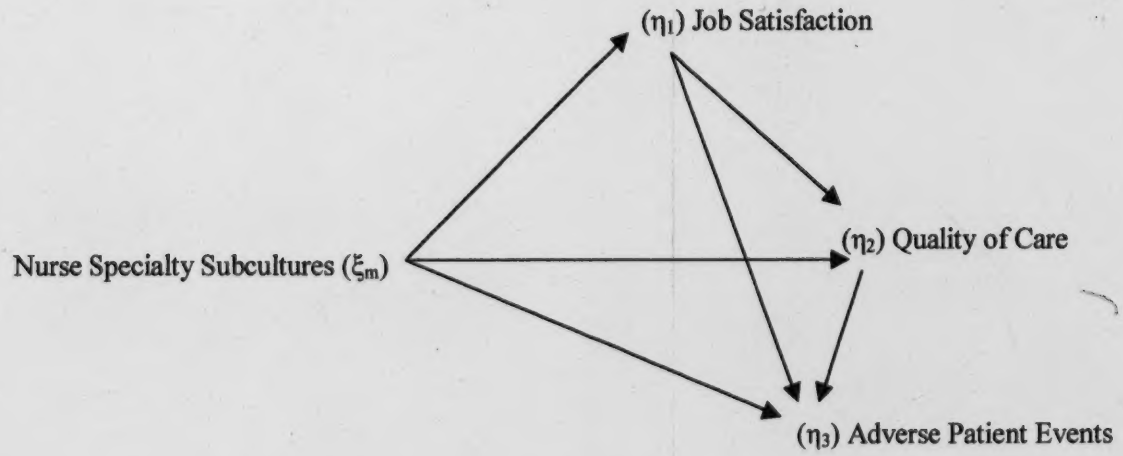
Theoretical Underpinnings of the Model

This study mainly explores hospital nurse specialty subcultures. In the literature review on the effects of hospital subcultures on outcomes, I found that "nurse job satisfaction" and "quality of care" were two of the most frequently studied nurse and patient outcomes respectively. Since these concepts were available in the data set I used, I included both of them in the model as mechanisms (intervening variables) for investigating the impact of nurse specialty subcultures on adverse patient occurrences. Adverse patient events is a construct partially defining/determining quality of care, while there is evidence that job satisfaction influences both the quality of care and adverse patient outcomes. Therefore, four main concepts are included in the model: nurse specialty subcultures, job satisfaction, quality of care, and adverse patient events (Figure 3.1). Next, I describe each of them and briefly refer to the recent literature on these concepts.

Nurse Specialty Subcultures

Nurse professional specialty subculture (NSSC) is defined, in this study, as nurses' interpretative patterns of meanings or perceptions of a broad range of cultural manifestations (e.g., values, beliefs, practices) at the level of a particular nurse specialty. Given this, in each specialty subculture, nurses' perceptions are based not only on *different spatial environments but also on the same specialty*. *Spatial* subculture refers to a group of individuals who live or work in a certain location with physical (usually) boundaries, as in the case of a nursing unit. *Specialty* subculture refers to a group of individuals (e.g., nurses) who work in the same professional specialty but in one or more spatial units (e.g., nursing units) within organizations (e.g., hospitals).

Figure 3.1 - The Simplest Conceptual Model



Spatial and specialty subcultures overlap or coincide much of the time in settings such as intensive care units (ICU), operation / recovery rooms (OR), emergency (ER), pediatrics, and psychiatric, since general hospitals commonly have only one unit of these specialties. Nurses employed in the same specialty share training, experiences, skills and abilities, similar patients, and a set of values, norms, and perspectives. Additionally, supervisors and colleagues generally have similar experiences, networks, and mentalities (way of thinking and behaving), and share meetings, conferences, and the like. Further, nurses with specific demographics (e.g., age, level of education) can sometimes be found in certain nurse specialties (e.g., ICU, ER), which affects and contributes to developing professional subcultures.

Using Martin's work on subcultures within organizations, I drew up a model for this study to investigate nurse *specialty* subcultures (NSSCs). Four nurse specialty subcultures were included in this study: medical, surgical, ICU, and emergency. Medical and surgical subcultures represent nurses employed in specific specialties (i.e., medical or surgical) but not necessarily in the same spatial unit, since hospitals usually have more than one nursing unit in these specialties. On the other hand, intensive care unit and emergency subcultures often coincide with spatial nursing units within a hospital.

Job Satisfaction

Job satisfaction has been extensively studied. Lack of nurse job satisfaction and high rates of turnover have troubled the profession for decades. Nurse job satisfaction has long been recognized as an important indicator of quality of care and cost savings.[70] Also, it has been found that the relationship between job satisfaction and quality of care is reciprocal. Nurses committed to the job are more likely to be satisfied with the quality of care they provide.[70] Laschinger et al.[163] argued that trust in management is a variable that affects both nurse job satisfaction and predicts nurse perception of quality of care. Similarly, job dissatisfaction has been found to be causally associated with lower productivity, higher absenteeism, increased work-related errors, and job turnover.[28,44] In contrast, determinants of job satisfaction included experience, full-time/part-time employment, type of unit, salary, and autonomy.[28] In addition, magnet hospitals have been widely recognized as the ideal setting for higher levels of nurse job satisfaction.[152,153,154] Further, Gillies et al.,[109] found evidence that organizational climate (i.e., responsibility, warmth, support, and identity) contributes to nurse job satisfaction.

Quality of Care

A question that arises is, "Why is quality of care important?" Quality of care is of interest for three reasons. First, to some degree, improved quality of care can reduce costs.[35,130] Second, better quality of care can result in better patient outcomes and health status,[83] and, third, the movement for quality healthcare expresses a human desire to do the right thing.

Quality of care is a complex concept. Mechanic[195] defined quality of care as a system property and not a product of health professional interaction with patients. Each healthcare practitioner's responsibility is to do his or her best for each patient, within the framework of social and organizational constraints and facilitators.[87] The organization is

responsible for the framework that facilitates practitioners' provision of care. The U.S. Institute of Medicine (IOM), adopting Lohr's[174] definition, has defined quality of care as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge"[127]. The same report by the IOM[127] emphasized the need for improving quality of care through the key approach of reducing errors and adverse patient events. However, even though the U.S., for example, spends a large proportion of its Gross National Product (GNP) on healthcare, several deficits were identified in the quality of care it provides.[191] The World Health Organization (WHO)[298] recently reported that quality of healthcare and patient safety were important objectives for national health systems in all countries. WHO has collaborated with concerned researchers to find the best strategies to ensure quality of care and patient safety in hospitals.

Since Donabedian[86,87] first described the structure, process, and outcome model of quality, a number of studies have been published. In the healthcare sector, organizational culture has been associated with outcomes such as quality of nursing care, job satisfaction, and patient safety.[111] There is substantial evidence that organizational culture accounts for a significant portion of the variability in quality of care, even though researchers used several terms, such as practice environment, organizational climate, and work context, to describe aspects of organizational culture. In numerous studies, investigators found a relationship between organizational culture and quality of care.[3,5,50,51,54] In addition, other organizational characteristics (e.g., number of registered nurses, hours of nursing care per day) influence quality of care.[209,210]

A big problem in measuring quality of care is the choice of indicators, since there are a potentially limitless number of dimensions.[102] It is clear that there are a plethora of indicators but they vary widely in what they measure. Several researchers argue that the concept of quality should be measured by questions addressing overall quality.[254,255] On the other hand, others prefer to study parts of quality of care (e.g., adverse patient events),[29,31,291] even though these specific indicators usually capture only fragments of important aspects of quality of care. Nevertheless, studying one or more components of quality of care assists in understanding, and sometimes solving, part of the problem.

Two criteria must be met for selecting the best indicator for the concept of quality of care: precision and perspective. Sochalski[254] argued that measuring quality of care with an overall question may lack *precision*, whereas a global term may capture all the details of this concept that could not be measured even with lengthy surveys. The Agency for Health Care Research and Quality (AHRQ)[1] recognized that *perspective* is an important parameter in evaluating quality of care. Shannon et al.[246] further illuminated the importance of perspective in evaluating quality of care by providing evidence on the differences in perceptions of quality of care amongst physicians, patients, and nurses. Within the same nursing unit, physicians provided higher ratings of the quality of care being provided than did patients, who in turn rated quality of care higher than did nurses. In light of the above findings, I elected to measure, in the proposed study, nurse perspectives on quality of care in her/his unit with an overall question. In a recent study, Sochalski[255] found that structural and process features of the practice environment were

associated with quality of nursing care, but process of care indicators had stronger effects on quality ratings. Cultural manifestations are considered process variables, which in turn are believed to be associated with specific outcomes.

Adverse Patient Events

Mid-1999 witnessed the beginning of a movement against medical errors and toward patient safety. The US Institute of Medicine (IOM) reported that, as of that time, errors resulting in negative patient incidents led to an estimated 44,000 to 98,000 deaths per year in the United States,[126] which rivals the number of deaths due to automobile accidents.[164] The IOM also grossly reported that, in both the United Kingdom and Canada, patient deaths due to medical errors were a level exceeding 10,000 per year in each country. Before the IOM report, Andrews et al.[14] reported that 17.7% of intensive care unit patients experienced at least one serious adverse event, while the likelihood of experiencing an adverse event increased by 6% for each day of hospitalization. In a British study[288] in two acute care hospitals, researchers found that 11% of patient experienced at least one adverse event, about half of these adverse events were preventable, and a third of them led to disability or death.

Apart from mortality, other adverse patient occurrences (most notably, medication errors, patient falls, and nosocomial infections) due to errors were also found in the literature. These adverse events are undesirable but preventable incidents that often occurred in nursing units and are routinely monitored in hospitals. In one study,[179] the availability and consistency of patient outcome indicators were examined, including medication errors, patient falls, occurrences of new pressure ulcers, nosocomial infections, and unplanned readmission to hospital. The results indicated that only data on medication errors and patient falls were consistently collected by the hospitals included in the study. Several studies reported similar epidemiological information pertaining to adverse patient events.[165,270] Adverse events occurred in 2.9% to 3.7% of hospital admissions, 30% to 58% of which were potentially preventable.

1. Medication Errors

There are a number of definitions of what constitutes a medication error. Medication errors are a multidisciplinary problem, and thus a multidisciplinary approach is required in order to reduce the incidence of errors.[213] Phillips et al.[217] claimed that 7,391 patients have died due to medication errors in 1993 in the US. Medication administration is an integral part of a nurse's role. It is estimated that approximately 40% of nurses time is consumed by medication administration,[15] while 34% of medication errors occur during administration, as opposed to errors taking place as part of ordering, transcribing, or dispensing.[22] Bates[23] argued that medication errors are common in hospitals, but that only about 1% of them actually result in harm to the patient. However, about 30% of injuries due to medications in hospitals are associated with a preventable medication error. Several factors contribute to medication errors such as shortage of registered nurses, frequent interruptions and distractions, using nurses to perform non-nursing activities, limited access to information systems, and workspaces that not designed to facilitate nursing practice.[128]

Both Leape et al.[165] and Thomas et al.,[270] using retrospective chart reviews, reported that approximately 19% of all adverse events were medication-related occurrences, making it the largest single category of adverse events. An Australian report revealed that 26% of all adverse incidents recorded in hospitals up to 2002 were medication-related.[18] In another Australian study referring to medication errors, the system of supplying medications to patients was found to play an important role. In 'ward stock' systems, error rates ranged from 15% to 20%, whereas in pharmacy-based systems the rates ranged from 5% to 8%. Among these errors, only one-fifth of cases were clinically significant and in two-thirds of cases potentially clinically significant.[223] Similarly, the findings of another study[37] showed that adverse events occurred in 3.7% of hospitalizations and that 27.6% of the adverse events were due to negligence. Although 70.5% of the adverse events resulted in disabilities lasting less than six months, 2.6% caused permanently disabling injuries, and 13.6% led to death. There were significant differences in rates of adverse events among categories of clinical specialties.

An error associated with medications can be related to a significantly prolonged length of stay, increased economic burden, and an almost 2-fold increased risk of death.[55] Specifically, the average additional length of stay was approximately 2.2 days, and the average increase in cost of hospitalization was $3,244.[24] The annual costs attributable to preventable medication errors for a 700-bed teaching hospital were an estimated $5.6 million.[24]

Recently, the US Institute of Medicine,[128] in its fourth report, argued that nurses and their interventions are directly associated with patient outcomes.[135,203] Their vigilance prevents or intercepts error. In one study, researchers found that nurses intercepted 86% of all medication errors made by physicians before the error reached the patient.[166] A number of studies contacted recently on adverse patient outcomes have included unit rates of medication errors, patient falls, skin breakdown, patient and family complaints, infections, and deaths. On nursing units, in particular, it was found that (1) more experienced nurses had fewer medication errors and patient falls[32]; (2) a higher proportion of hours of care delivered by RNs was inversely related to the unit rates of medication errors, pressure ulcers, and patient complaints[31]; and (3) a higher RN skill mix was associated with a lower incidence of adverse occurrences in general.[29] Vincent et al.[289] in studying the reasons for not reporting adverse patient incidents in two obstetrics units, found that midwives were more likely to report adverse events than physicians. In the main reasons for not reporting adverse occurrences included a not clear purpose of reporting, what to report, and where to find the reporting form.

2. Patient Falls

In an early study of patient falls in a metropolitan hospital,[208] researchers reported that, over a one-year period, the incidence of falls was 2.3 per 100 patient bed-days. Among these falls, 27% were from beds and 18% from a chair. One-fourth (26.5%) of patients who fell sustained minor injuries and 3.6% a concussion or fracture. Although most falls do not result in serious physical injury, they can contribute to a loss of confidence and mobility, which can significantly reduce quality of life.[201] Three risk factors were identified: (1) a previous history of falls, (2) presence of confusion/disorientation, and (3)

needing help to toilet.[112] The time of day (greater risk during day shift) emerged as common risk factors in two studies.[208,292] Several researchers reported that nurses' job stress level and job satisfaction were strongly associated with the occurrence of patient incidents such as patient falls and medication errors.[88,277] Additionally, organization-specific characteristics contribute to patient outcomes.[277]

3. Nosocomial Infections

Nosocomial infections are defined as conditions that result from adverse reactions to the presence of an infectious agent or its toxins that were neither present nor incubating at the time of admission to the hospital.[106] The National Database for Nursing Quality Indicators (NDNQI) provides the following operational definition of the rate of nosocomial infections: "The rate per 1000 patients acute care days at which patients admitted to acute care settings develop bacteremia after the first 72 hours of their hospital stay, and for which there is no evidence to suggest the infection was present or incubated at admission."[13] In the U.S., an estimated 2 million nosocomial infections each year result in morbidity or mortality.[48] Among these infections, 500,000 occur annually due to surgical-site infections, according to an estimate by the Center for Disease Control and Prevention (as cited in Leape[164]). Of these surgical-site infections, 4.3% result in death annually (i.e., approximately 20,000 deaths).[143] However, even if nosocomial infections do not result in deaths, they still lengthen hospitalization and increase costs. In 1995, the estimated costs of nosocomial infections amounted to $4.5 billion in the United States.[294] Seago[240] found that a shortage of nurses was related to increased length of stay and nosocomial infections. Larson[161] argued that changing organizational unit culture resulted in significant improvement in hand-washing, which reduced nosocomial infections.

In summary, quality of nursing care affects patients' health status and is sometimes a matter of life and death. Further, preventable errors in the healthcare sector result in adverse patient occurrences that potentially affect their quality of life, length of stay, and hospital costs. The most commonly studied adverse events are medication errors, patient falls, and nosocomial infections. In this study, these three occurrences are examined. The model, in its simplest form, is depicted in Figure 3.1.

The Conceptual Model

The concept of organizational culture is complex. This complexity is related to many factors that demand inclusion in the model. However, including into the model any factor merely because is associated with culture is not wise for two reasons. First, the canon of parsimony of science is violated. Second, it is simply not possible to estimate an unlimited number of unknown variables (coefficients) from a limited number of known ones (data). For a variable or effect to warrant inclusion in a model, there should be reasonable and sound grounds for doing so, based on substantive theory. Otherwise, identification problems would arise. Additionally, fewer estimated coefficients (variables), in general, would be preferable because the implications of these variables are derived from the best available theory.[120]

Bearing this in mind, I tried to keep the model used in this study focused and parsimonious, with as many constraints as possible. *Focus*, in this case, refers to

developing a specific and distinct model that does not attempt to include every concept related to organizational culture. *Parsimony* refers to including as few structural estimated coefficients (effects) as possible in order to achieve an acceptable fit. *Constraints* refer to a combination of model and data restraints. Theoretical (model) constraints refer to the specification both of variables included in the model and of the free structural coefficients linking them. Data constraints refer to the comparison of the two models: the theoretical model and the model based on observed data. Having more model and/or data constraints assists in avoiding or eliminating identification problems, that is, failure to determine unique estimates.[120]

Endogenous Concepts

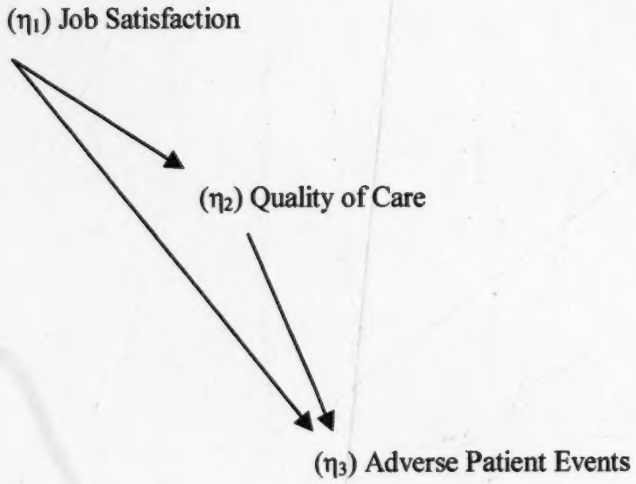
The model, as depicted in Figure 3.1, includes four main concepts: nurse specialty subcultures, nurse job satisfaction, quality of care, and adverse patient events. I hypothesized that nurse specialty subcultures (exogenous variable) influence job satisfaction, quality of care, and the nature and number of adverse patient events (endogenous variables) (Figure 3.2). In turn, based on my hypothesis, job satisfaction influences quality of care and adverse patient events, while quality of care affects adverse patient events. The final variable of interest is adverse patient events, which directly influenced through the impact of nurse specialty subcultures on quality of care, and, indirectly, through nurse job satisfaction, which in turn affect the provision of quality of care.

The model is fully recursive, meaning that effects are going from nurse specialty subcultures to job satisfaction, quality of care, and adverse patient events, but not in the reverse direction (e.g., from quality of care to job satisfaction). In other words, I assumed that nurse specialty subcultures causally influence job satisfaction, quality of care, and patient adverse events and not the other way around (reciprocal). Note that the direction of causal effects presumes that interventions affecting nurse specialty subcultures have the potential of improving the provision of quality of care and preventing patient adverse effects, which represents the clinical significance of the model. Silber et al.[249] did find that adverse patient events and total quality of care were linked with reciprocal effects. However, since one of this study's objectives was to understand how organizational culture influences patient outcomes and not how adverse patient events affect quality of care, reciprocal effects were not included in the model. The implications of not including reciprocal effects in the model affected the total effect of job satisfaction on quality of care and adverse patient events by not assessing the indirect effect from quality of care to job satisfaction.

Exogenous Concepts

In this study, nurse specialty subcultures refer to a number of cultural manifestations (i.e., practices and content themes) present in each nurse specialty. Martin[182] makes note of three types of cultural manifestations: a) Cultural forms, b) Practices (formal and informal), and c) Content themes (espoused and inferred values, and emotional concerns). Using Martin's framework, the theoretical and operational definitions of organizational culture and subcultures for this study are as follows.

Figure 3.2 - Endogenous Concepts



Theoretical: Organizational subculture is the deep interpretative patterns of meanings at a subcultural level that link a broad range of cultural ideational and material manifestations together, whether in harmony (shared), in conflict, or in ambiguity and contradiction.

Operational: Organizational subculture, in this study, consists of two components: practices (formal and informal) and content themes. Both components represent ideational and materialist cultural manifestations. In general, practices are defined as activities or habits that regularly take place in an organization. They usually involve beliefs or an accepted way of doing things. Specifically, formal practices are written rules, whereas informal practices are unwritten guidelines or social rules. Content themes are defined as cognitive (i.e., beliefs, tacit assumptions) or attitudinal (i.e., values) expressions of the interpretations of cultural manifestations. Additionaly, content themes refer to emotional concerns, which are inferred themes or job-related emotions referring to a deeper level of employees' interpretations of their work environment. In this study:

- Formal practices included satisfactory salary, continuing education, quality assurance programs, and preceptorship for newly hired registered nurses.
- Informal practices (behavioral norms) included nurse professional autonomy, control over practice, and relationships between nurses and physicians.
- Content themes included only emotional concerns referring to emotional exhaustion due to practice environment.

Among the formal practices, salary is expected to directly influence only job satisfaction, while quality assurance programs should influence quality of care and adverse patient events, but not job satisfaction. Continuing education and preceptorship for newly hired nurses should directly influence all three endogenous variables (job satisfaction, quality of care, and adverse patient occurrences). All informal practices and emotional concerns were expected to have direct effects on job satisfaction, quality of care, and adverse patient outcomes (Figure 3.3).

The model also includes two demographic and three dummy variables pertaining to nurse specialty subcultures. The demographic variables refer to experience and type of employment (i.e., full-time or part-time), and the dummy variables to surgical, ICU, and emergency, while the medical nurse specialty subculture was used as the reference group. I hypothesized that the demographic variables would have direct effects on job satisfaction, quality of care, and adverse patient occurrences. Additionally, I expected that highly specialized subcultures (e.g., ICU) would have fewer adverse events than the least specialized subcultures (e.g., medical). As Aiken and associates[7] described, more specialized units have better communication and relationships among colleagues, more control over their practice, and more autonomy. These factors, as cultural manifestations, describe desirable organizational subcultures that can influence reversibly adverse patient events. The conceptual model is diagrammatically represented in Figure 3.4.

Figure 3.3 – Exogenous Concepts

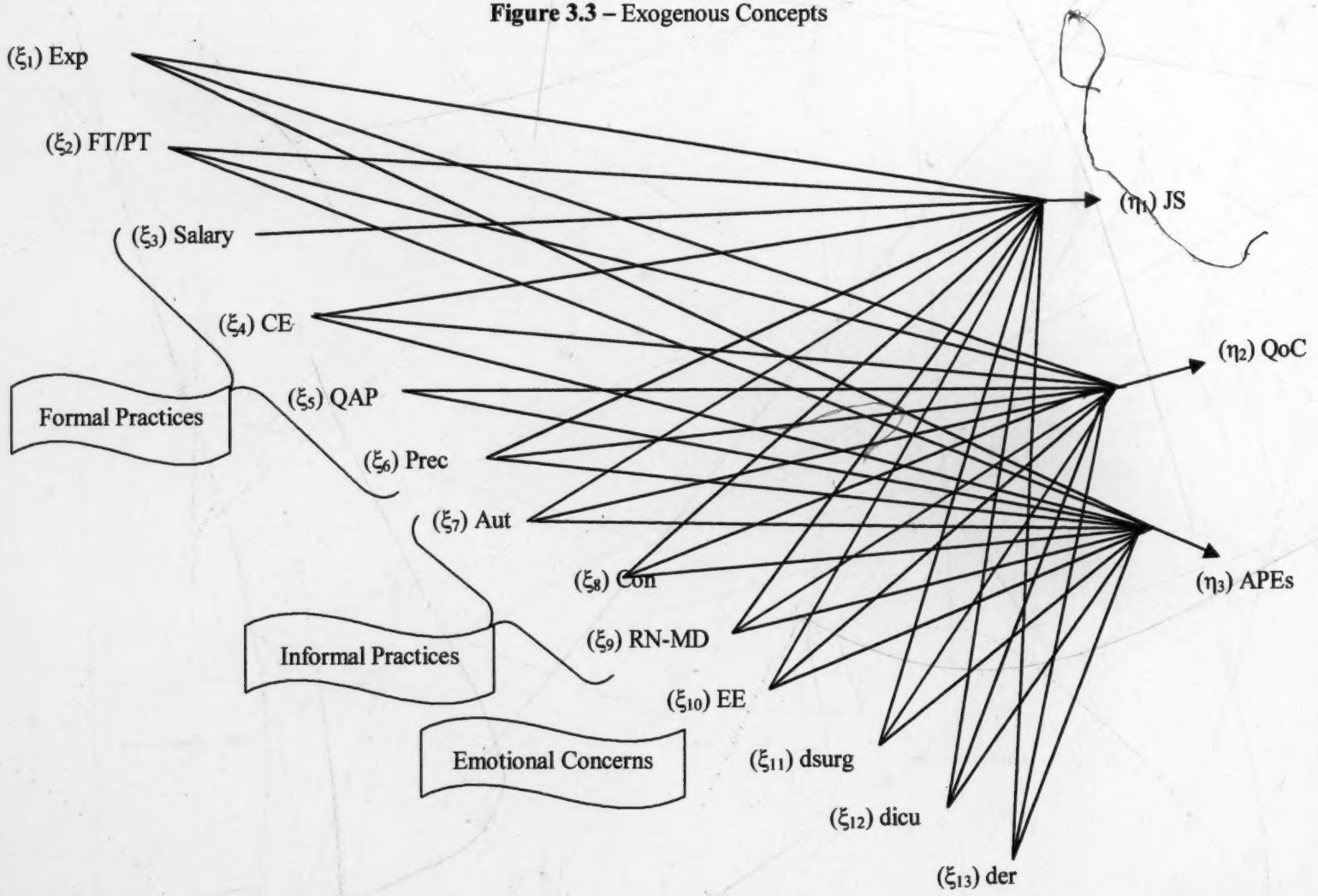
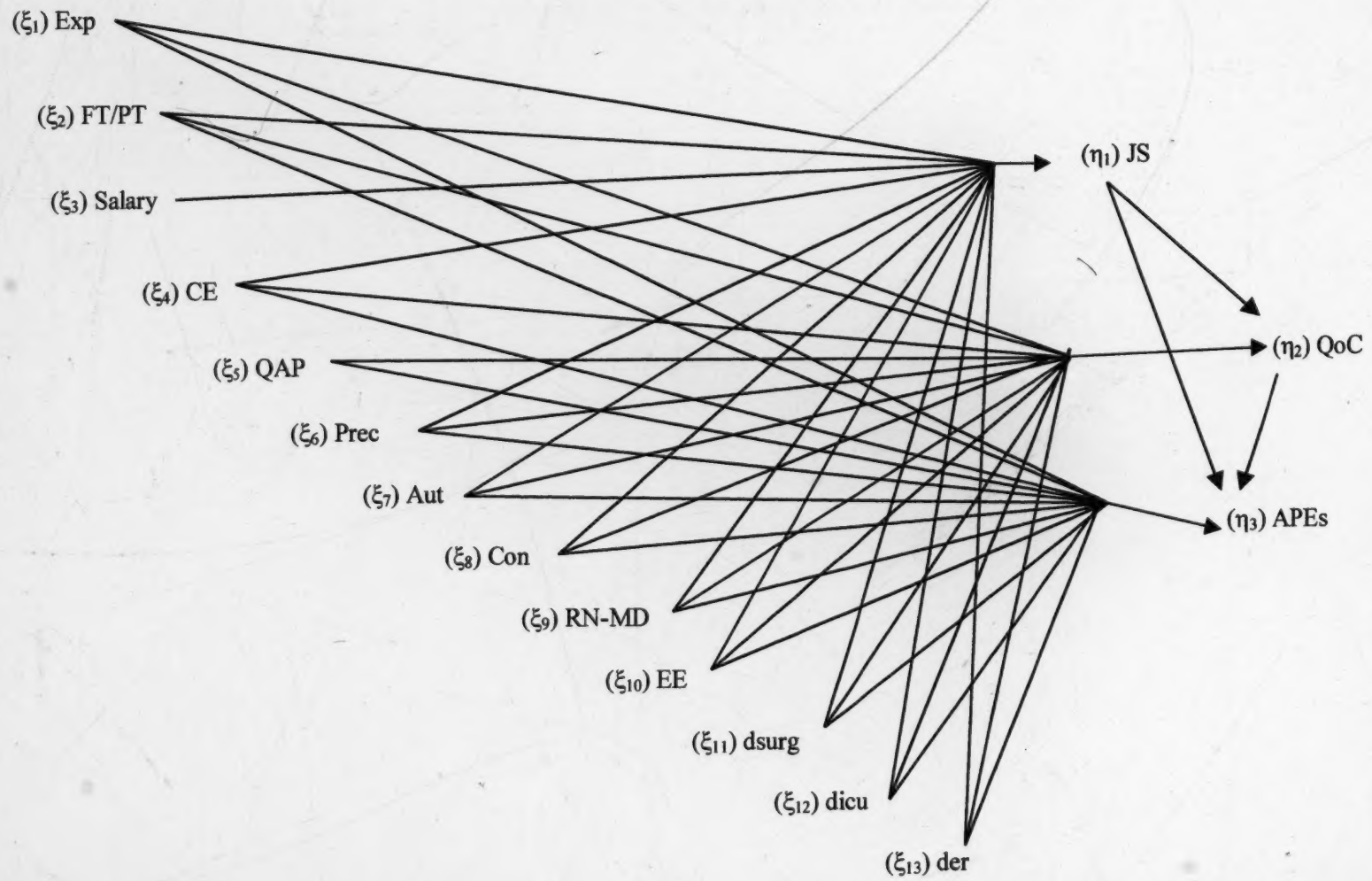


Figure 3.4 – The Conceptual Model



The Complete Model

The model "Organizational Culture / Nurse Specialty Subcultures and Patient Outcomes" includes sixteen concepts – thirteen exogenous and three endogenous. Exogenous concepts, referred to as ksi's (ξ), are caused by factors outside the model, whereas endogenous concepts, referred to as eta's (η), are explained (caused) by other variables in the model. Eleven of the exogenous variables are related to organizational culture (formal practices, informal practices, emotional concerns, and dummy variables pertaining to nurse specialty subcultures) and two demographic variables (experience and full-/part-time) are related to nurses. All exogenous variables covary. Of the three endogenous variables, one concept (job satisfaction) is related to nurses, and the other two concepts (quality of care and adverse patient events) are related to patient outcomes. Each (endogenous or exogenous) variable has an estimated error term, which means that the variables included in the model are not expected to explain all the variance of the concept. The conceptual and operational definitions of each concept included in the model are described in the next section.

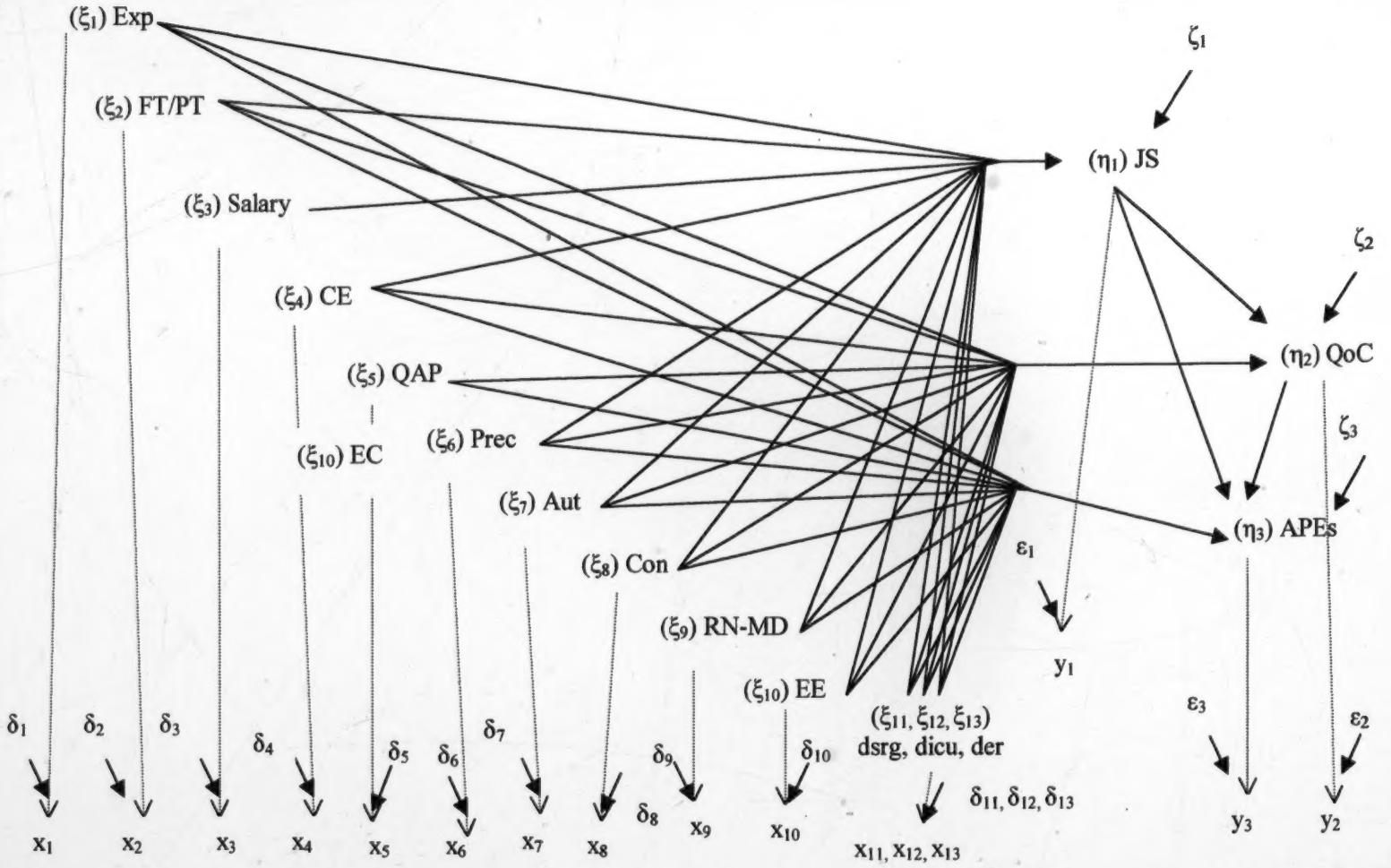
The Measurement Model

All concepts in the model were measured. The values of each manifest variable (indicator) were based on the actual responses provided by the survey respondents (nurses). The indicators used to measure each concept in the model (exogenous and endogenous), the causal effects among concepts, and the estimated measurement errors are discussed next. The measurement model is diagrammatically represented in Figure 3.5.

Theoretical and Operational Definitions of Exogenous Concepts

The exogenous variables of the model include two nurse demographic characteristics, eight cultural manifestations, and three dummy variables related to nurse specialty subcultures. Demographic characteristics refer to experience and full-/part-time employment. Cultural manifestations were measured by the Nursing Work Index (NWI) and the Maslach Burnout Inventory (MBI), which were used to assess ideational and material manifestations of organizational culture/subcultures. Martin[182] describes three types of cultural manifestations: a) Cultural forms, b) Practices (formal and informal), and c) Content themes (espoused and inferred values, and emotional concerns). I classified the 51 NWI items according to their relevance to either formal or informal practices. I then selected four items considered relevant to formal practices and quality of care, and three subscales assessing informal practices that have been studied in the magnet hospital studies. Similarly, I classified the 22 MBI items relevant to emotional concerns according to their affiliation with either patients or work. Finally, I selected the emotional exhaustion (EE) subscale (9 items), which has been used in several studies.[3,7] A detailed description of the classification and justification of each item included in this study is provided in Appendix A. Finally, three dummy variables related to nurse specialty subcultures (i.e., surgical, ICU, and emergency) are included in the model. The medical nurse specialty subculture is the reference group.

Figure 3.5 - The Measurement Model (all exogenous variables covary)



The selection of items designated conceptually as formal practices were tested for face and content validity with two faculty members and an experienced nurse working in a hospital in the Capital Health Region. The three subscales referring to as informal practices were first identified and studied by Aiken and Patrician,[6] who published Cronbach's alpha values for the three subscales of 0.75, 0.79, and 0.76 respectively for individual level data and 0.85, 0.91, and 0.84 respectively for unit level aggregated data. Estabrooks and associates[95] calculated the inter-item correlations for the three conceptually-derived subscales reported by Aiken and Patrician[6] as 0.74, 0.77, and 0.83 for nurse autonomy, control over practice, and nurse-physician relationships respectively. Additionally, Estabrooks and associates,[95] using a 26-item scale, found an inter-item correlation of 0.93.

Experience (ξ_1)
Theoretical: Experience refers to the number of years the nurse had worked in the current unit.
Operational: Measured by the question: "How many years have you worked … on your current unit(s)?" (item A5c). In Figure 1, the concept is labeled "Exp" (ξ_1) and its indicator is x_1.

Full-/Part-time (ξ_2)
Theoretical: Full-/Part-time refers to the type of work (contract) the nurse had with the current hospital.
Operational: Measured by the question: "In the past year, how many hours per week did you work, on average?" (item A7). Responses, ranging from 2 to 80, were coded 1 for those working 35 or more hours per week (full time) and 2 for those working 34 or fewer hours per week (part-time) using listwise deletion of the missing values. In Figure 1, the concept is labeled "FT/PT" (ξ_2) and its indicator is x_2.

Satisfactory Salary (ξ_3)
Theoretical: Satisfactory salary refers to a nurse's satisfaction with her/his current salary.
Operational: Measured by nurse responses, whether they strongly agreed (1), somewhat agreed (2), somewhat disagreed (3), or strongly disagreed (4) that the following organizational characteristic was present in their current work environment: "A satisfactory salary" (item B5). Higher scores on this item indicate a lower level of agreement with the presence of the above organizational characteristic and, hence, less satisfaction with their salary. The item was reverse coded in the analysis so that higher scores indicate more satisfaction. In Figure 1, the concept is labeled "Salary" (ξ_3) and its indicator is x_3.

Continuing Education (ξ_4)
Theoretical: Continuing education refers to a program of continuing education for nurses in their current jobs.
Operational: Measured by nurse responses, whether they strongly agreed (1), somewhat agreed (2), somewhat disagreed (3), or strongly disagreed (4) that the following organizational characteristic was present in their current work environment: "Active staff development or continuing education programs for nurses" (item B7). Higher scores on

this item indicated a lower level of agreement with the presence of the above organizational characteristic. This item was reverse coded in the analysis so that higher scores indicate strong agreement with the statement. In Figure 1, the concept is labeled "CE" (ξ_4) and its indicator is x_4.

Quality Assurance Program (ξ_5)
Theoretical: Quality assurance program refers to the presence of a such a program in the current job.
Operational: Measured by nurse responses, whether they strongly agreed (1), somewhat agreed (2), somewhat disagreed (3), or strongly disagreed (4) that the following organizational characteristic was present in their current work environment: "An active quality assurance program" (item B34). Higher scores on this item indicate a lower level of agreement with the presence of the above organizational characteristic. This item was reverse coded in the analysis so that higher scores indicate strong agreement with the statement. In Figure 1, the concept is labeled "QAP" (ξ_5) and its indicator is x_5.

Preceptorship (ξ_6)
Theoretical: Preceptorship refers to the presence of a preceptor program for newly hired registered nurses in their current jobs.
Operational: Measured by nurse responses, whether they strongly agreed (1), somewhat agreed (2), somewhat disagreed (3), or strongly disagreed (4) that the following organizational characteristic was present in their current work environment: "A preceptor program for newly hired RNs" (item B37). Higher scores of this item indicate a lower level of agreement with the presence of the above organizational characteristic. The item was reverse coded in the analysis so that higher scores indicate strong agreement with the statement. In Figure 1, the concept is labeled "Prec" (ξ_6) and its indicator is x_6.

Professional Nurse Autonomy (ξ_7)
Theoretical: Professional nurse autonomy refers to the freedom the nurse has to make decisions for patient care.
Operational: Measured by summing responses to a three-item subscale. Each item asked nurses whether they strongly agreed (1), somewhat agreed (2), somewhat disagreed (3), or strongly disagreed (4) that "Nursing controls its own practice" (item B6), "Freedom to make important patient care and work decisions" (item B17), and "Not being placed in a position of having to do things that are against my nursing judgment" (item B21). I created the three-item subscale using listwise deletion of the missing values, whose scores range from 3 to 12. Higher scores indicate a lower level of agreement. These items were reverse coded in the analysis so that higher scores indicate stronger agreement with the statements. In Figure 1, the concept is labeled "Aut" (ξ_7) and its indicator iss x_7.

Control Over Practice (ξ_8)
Theoretical: Control over practice refers to the extent that nurses control their professional practice.
Operational: Measured by summing responses to a five-item subscale. Each item asked nurses whether they strongly agreed (1), somewhat agreed (2), somewhat disagreed (3), or strongly disagreed (4) that "Adequate support services allow me to spend time with my

patients" (item B1), "Enough time and opportunity to discuss patient care problems with other nurses" (item B11), "Enough registered nurses on staff to provide quality patient care" (item B12), "A nurse manager or immediate supervisor who is a good manager and leader" (item B13), and "Working with nurses who are clinically competent" (item B30). I created the five-item subscale using listwise deletion of the missing values, whose scores range from 5 to 20. Higher scores indicate a lower level of agreement. These items were reverse coded in the analysis so that higher scores indicate stronger agreement with the statements. In Figure 1, the concept is labeled "Con" (ξ_8) and its indicator is x_8.

Relationships Between Nurses and Physicians (ξ_9)
Theoretical: Relationships between nurses and physicians refer to the working interactions between nurses and physicians.
Operational: Measured by summing responses to a two-item subscale. Each item asked nurses whether they strongly agreed (1), somewhat agreed (2), somewhat disagreed (3), or strongly disagreed (4) that "Physicians and nurses have good working relationships" (item B2) and "A lot of team work between nurses and physicians" (item B24). I created the two-item subscale using listwise deletion of the missing values, whose scores range from 2 to 8. Higher scores indicate a lower level of agreement. These items were reverse coded in the analysis so that higher scores indicate stronger agreement with the statements. In Figure 1, the concept is labeled "RN-MD" (ξ_9) and its indicator is x_9.

Emotional Exhaustion (ξ_{10})
Theoretical: Emotional exhaustion, a component of burnout, refers to job-related negative feelings (e.g., frustration, tension, fear at the prospect of returning to work for another day, etc.) and is characterized by lack of energy associated with practice environment.[66]
Operational: Measured by the nine-item emotional exhaustion (EE) subscale of the MBI.[187] The emotional exhaustion subscale (a standardized tool) was measured by summing responses to the following items: a) "I feel emotionally drained from my work" (item C1), b) "I feel used up at the end of the workday" (item C2), c) "I feel fatigued when I get up in the morning and have to face another day on the job" (item C3), d) "Working with people all day is really a strain for me" (item C6), e) "I feel burned-out from my work" (item C8), f) "I feel frustrated by my job" (item C13), g) "I feel I'm working too hard on my job" (item C14), h) "Working directly with people puts too much stress on me" (item C16), and i) "I feel like I'm at the end of my rope" (item C20). These items asked nurses to indicate how often they had these job-related feelings. The responses for each item was coded 0 = never, 1 = a few times a year or less, 2 = once a month or less, 3 = a few times a month, 4 = once a week, 5 = a few times a week, and 6 = every day. Then, I created the nine-item subscale using listwise deletion of the missing values, whose scores range from 0 to 54. The items in the frequently-used EE subscale refer to negative feelings and, hence, higher scores indicate higher levels of emotional exhaustion. The EE subscale has reasonable psychometric properties, which have been published in several articles and studied by several researchers, including Aiken and Sloane,[7] who found a Cronbach's alpha of 0.89 and an average inter-item correlation of 0.47. In Figure 1, the concept is labeled "EE" (ξ_{10}) and its indicator is x_{10}.

Nurse Specialty Subcultures ($\xi_{11, 12, 13}$)
Theoretical: Nurse specialty subcultures represent the professional nursing culture in four specialties (i.e., medical, surgical, ICU, and emergency).
Operational: Nurse specialty subcultures are represented by four dummy variables, each coded 1 for the specialty of interest and 0 for the remaining subcultures using listwise deletion of the missing values. In Figure 1, the concept of subcultures is labeled using "dsrg" (ξ_{11}), "dicu" (ξ_{12}), and "der" (ξ_{13}), while the medical subculture ("dmed") is the reference group. Their indicators are labeled as x_{11}, x_{12}, x_{13} respectively.

Theoretical and Operational Definitions of Endogenous Concepts
The final endogenous concept of the model is adverse patient events. The intervening endogenous concepts are nurse job satisfaction and quality of care.

Nurse Job Satisfaction (η_1)
Theoretical: Nurse job satisfaction is defined as an attitudinal state and/or feelings of the nurse derived from her/his perception that the current job conditions are satisfying.[28,152]
Operational: Job satisfaction was measured by responses to the question: "Overall, how satisfied are you with your present job" (item D1). Responses were coded 1 = very dissatisfied, 2 = a little dissatisfied, 3 = moderately satisfied, and 4 = very satisfied. Higher scores indicate higher job satisfaction. In Figure 1, the concept is labeled "JS" (η_1) and its indicator is ψ_1.

Quality of Care (η_2)
Theoretical: The balance of expected gains (benefits) and losses (harms) arising from the care process represents the core of this concept.
Operational: Measured by the following question based on nurses' assessment: "In general, how would you describe the quality of nursing care delivered to patients on your unit?" (item D7). The responses were rated on a four-point scale with 1 = excellent, 2 = good, 3 = fair, and 4 = poor. The responses were reverse coded in the analysis so that higher scores indicate higher levels of quality. In Figure 1, the concept is labeled "QoC" (η_2) and its indicator is ψ_2.

Adverse Patient Events (η_3)
Theoretical: Adverse patient events refer to undesirable but preventable patient occurrences such as medication errors, patient falls, and nosocomial infections. The best way to capture the richness of the concept of adverse patient events is to monitor all undesirable incidents for a specific period of time. However, an index of these incidents captures the core meaning of the concept.
Operational: This concept was measured by nurse responses to the questions: "Over the past year, how often have each of the following incidents [patient received wrong medication or dose, nosocomial infections, and patient falls with injuries] occurred involving you or your patients?" (item $D8_{1,2,4}$). Each of the three items was scored as follows: 1 = never, 2 = rarely, 3 = fair, and 4 = frequently. In the analysis, I recoded the responses for the set of three items as 0 = none of the three occurred or 1 = each of the three occurred at least once (dichotomous variable). Then, I created an index of these three items (APEs) using listwise deletion of the missing values, whose scores range from

0 to 3. A score of zero indicates that none of the adverse patient occurrences happened over the past year, while a score of three represents all of these events happening at least once. In Figure 1, the concept is labeled "APEs" (η_3) and its indicator is ψ_3.

Description of Model's Causal Effects

Nurse job satisfaction (η_1): According to the model, the conceptual variable of job satisfaction (JS, η_1) is causally influenced by several exogenous variables. These variables include experience (Exp, ξ_1), full-/part-time work (FT/PT, ξ_2), salary (ξ_3), continuing education (ξ_4), preceptorship (ξ_6), autonomy (ξ_7), control (ξ_8), relations (ξ_9), emotional exhaustion (ξ_{10}), and nurse specialty subculture (ξ_{11}). I hypothesized that more experienced nurses are, the more satisfied. The full-/part-time variable is not standardized in relation to job satisfaction. Literature from about ten years ago indicated that nurses were generally more satisfied in a full-time job, whereas more recent literature indicated a preference for part-time jobs, even though satisfaction levels are highly dependent on their family constraints and commitments. Several researchers argued that work environment is one of the strongest factors influencing nurse job satisfaction and that the two are causally linked such that desirable organizational cultures tend to keep nurses more satisfied.[30,89,129,278] Irvine and Evans[129] found that economic variables were correlated with job satisfaction, but not as strongly correlated as work environment and job satisfaction. Continuing education and preceptorship programs, autonomy, control, and relationships between nurses and physicians all should positively influence job satisfaction, whereas emotional exhaustion should have a negative influence. The influence of nurse specialty subculture was expected to vary among specialties.

Quality of care (η_2): According to the model, the conceptual variable of quality of care (QoC, η_2) is causally influenced by the endogenous concepts of job satisfaction (JS, η_1). The exogenous concepts of experience (Exp, ξ_1), full-/part-time work (FT/PT, ξ_2), continuing education (ξ_4), quality assurance programs (ξ_5), preceptorship (ξ_6), autonomy (ξ_7), control (ξ_8), physician-nurse relations (ξ_9), emotional exhaustion (ξ_{10}), and nurse specialty subcultures ($\xi_{11}, \xi_{12}, \xi_{13}$) should causally influence quality of care as well. The causal mechanisms involved are explained next. Better quality of care is provided by satisfied[4,116,287] and more experienced nurses.[32] Shamian et al.[245] argued that nurses working full-time have a tendency to experience more burnout and job dissatisfaction than do part-time nurses. Continuing education, quality assurance, and preceptorship programs, autonomy, control, and relationships between nurses and physicians should positively influence quality of care, whereas emotional exhaustion should have a negative effect. The influence of nurse specialty subculture was expected to vary among specialties.

Adverse patient events (η_3): According to the model, the conceptual variable of adverse patient events (APEs, η_3) is causally linked with the endogenous concepts of job satisfaction (JS, η_1), and quality of care (QoC, η_2). Also, all exogenous variables except full-/part-time work and salary are expected to exert a causal influence on APEs. I hypothesized that better quality of care, more satisfied and experienced nurses would be associated with fewer adverse patient events. Also, continuing education, quality assurance, and preceptorship programs, autonomy, control, and better relationships

between nurses and physicians should be associated with less emotional exhaustion and fewer APEs, whereas emotional exhaustion should be associated with more APEs. The influence of nurse specialty subculture was expected to vary among specialties.

The endogenous variables (i.e., job satisfaction-η_1, quality of care-η_2, and adverse patient events-η_3) are linked with spurious relationships. In particular, they are related to several common causal variables such as experience (Exp, ξ_1), continuing education (ξ_4), preceptorship (ξ_6), autonomy (ξ_7), control (ξ_8), relations between nurses and physicians (RN-MD, ξ_9), and emotional exhaustion (ξ_{10}).

Measurement Errors

The criteria used to estimate measurement error in the indicators varied. The actual percentage of variance assigned to the error in each indicator is presented in Table 3.1. In job satisfaction, the error was estimated 5%, since nurses can assess their own job satisfaction. The assessed proportion of error variance in job satisfaction refers to random errors such as coding mistakes, data entry processes, misunderstanding of question, or any other kind of errors, such as exaggeration. The error in quality of care was estimated 10% because the concept is not well defined, nor easily measured. Each nurse is likely to have a somewhat different conceptualization of quality of care.

The estimated error in adverse patient events was 20% because nurses do not actually know the number or nature of adverse patient occurrences over the past year, forcing them to attempt to estimate, which is likely to result in large errors. The estimated error in indicators of exogenous concepts was as follows. For experience and full-/part-time work the estimated error was 1%, since nurses usually do not make mistakes in reporting this kind of information. The estimated error in salary was 5% because nurses know whether their salaries are satisfactory or not. For continuing education, quality assurance, and preceptorship programs, the error was estimated at 5% because nurses know whether there is such a program in their hospital. The errors for all informal practices (autonomy, control, and relationships between nurses and physicians) were estimated to be 10%, because all three indicators are scales of several items. The estimated error in emotional exhaustion was set to 5% because nurses know their emotions and can give correct information about them. Additionally, the emotional exhaustion index is a standardized tool based on several items. The estimated error in each of the nurse specialty dummy variables (i.e., dmed, dsrg, dicu, der) was 1%, since nurses do not make mistakes in reporting this kind of information. I expect that the assessed proportion of error variance in dummy variables reflects random errors due to coding mistakes, data entry processes, or some other kind of errors.

Strengths and Limitations of the Model

The strengths of this theory lie in the examination of organizational culture from the differentiation perspective (i.e., nurse specialty subcultures) and in terms of structural equation modeling.

Table 3.1 – Model I: Concepts, Indicators, and their Measurement

Item #	Concepts		Indicators		Assessed proportion of error variance
			Endogenous		
D1	Eta (η_1)	Nurse Job Satisfaction	Reported Satisfaction with present job	y_1	0.05
D7	Eta (η_2)	Quality of Care	Reported Quality of nursing care on unit	y_2	0.10
D8.1,2,4	Eta (η_3)	Adverse Patient Events	Index of reported medication errors, nosocomial infections, and patient falls with injuries	y_3	0.20
			Exogenous		
A5c	Ksi (ξ_1)	Experience	Reported Experience	x_1	0.01
A1	Ksi (ξ_2)	Full-time / Part-time	Reported Full-time / Part-time	x_2	0.01
B5	Ksi (ξ_3)	Salary	Reported Salary	x_3	0.05
B7	Ksi (ξ_4)	Continuing Education	Reported Continuing Education	x_4	0.05
B34	Ksi (ξ_5)	Quality Assurance Program	Reported Quality Assurance Program	x_5	0.05
B37	Ksi (ξ_6)	Preceptorship	Reported Preceptorship	x_6	0.05
	Ksi (ξ_7)	Autonomy	Index of 3 NWI items	x_7	0.10
	Ksi (ξ_8)	Control	Index of 5 NWI items	x_8	0.10
	Ksi (ξ_9)	Relations RN-MD	Index of 2 NWI items	x_9	0.10
	Ksi (ξ_{10})	Emotional Exhaustion	Index of 9 MBI items	x_{10}	0.05
	Ksi (ξ_{11})	NSSC (dsrg)	Dummy variable	x_{11}	0.01
	Ksi (ξ_{12})	NSSC (dicu)	Dummy variable	x_{12}	0.01
	Ksi (ξ_{13})	NSSC (der)	Dummy variable	x_{13}	0.01

Studying subcultures coexisting within an organization, especially in the healthcare sector, where knowledge is limited, is important to better understand the complexity of both the organization as a whole and its nested subcultures. The use of structural equation modeling provides evidence to practicing nurses, administrators, and policy-makers about the causal relationships between organizational culture and nurse specialty subcultures and outcomes. The direction of the causal effects may assist in understanding the operation of and interventions for organizational change. Finally, the clinical significance of this model refers to potential interventions on organizational culture and nurse specialty subcultures, interventions which may improve the provision of quality of care and prevent patient adverse events.

The limitations of this model reflect three disadvantages due to the analysis of secondary data. The first limitation refers to trade-off in choosing concepts and their indicators (e.g., nurse specialty subcultures) on account of data availability. For example, in the data set I used, there was no available information on nursing units. Therefore, I used nurse specialty subcultures instead of subcultures with physical boundaries. I believe that nursing unit subcultures are stronger than nurse specialty subcultures. Since the purpose of this study was to examine nested subcultures within hospitals and to explore the internal validity of the proposed model, nursing unit subcultures could potentially provide stronger evidence.

The second limitation refers to conceptual imprecision (e.g., organizational culture). For example, the concept of organizational culture was not actually measured by the survey questionnaire itself, but was rather constructed after thorough analysis and reflection on each question in the survey that was related to culture. It would have been easier to use an unedited concept instead of constructing one from individual (or a cluster of) items. Additionally, a limited number of cultural manifestations were available in (or extracted from) the data set. I would have liked to examine other cultural manifestations as well (e.g., values and beliefs, cultural forms, etc.) in order to get an in-depth understanding of hospital subcultures.

Third, the concepts of "quality of care" and "adverse patient events" were proxy variables describing patient outcomes. The nurse respondents could hardly be described as precise and adequate informants on these outcomes. After all, they reported their perceptions of quality of care based on a general idea about it, trusting their memory in terms of adverse occurrences. It would have been preferable to use administrative data on these outcomes, if such data were available. However, the use of structural equation modeling reduced these limitations by assessing the proportion of error variance in each concept.

Chapter 4
Method and Procedures

Research Design

This study analyzes data collected by a cross-sectional self-administered survey questionnaire, and estimates a series of structural equation models. The study can be described as a quantitative, cross-sectional research design specifying cause and effect between variables, based on a theoretical framework.[38] Structural equation modeling is generally considered to be a research design,[169,220] in which the unit of analysis was the individual nurse. In this chapter, I first describe in detail the original Alberta study (primary study) and, second, the present study (secondary study).

Primary Study

The Alberta data set used for this study is part of an international multidisciplinary research project known as the International Study of Hospital Staffing and Organization on Patient Outcomes, which was conducted in 1998 and early 1999 by the Center of International Hospital Outcomes Research Consortium.[256] The Consortium consisted of researchers from Canada (Alberta, British Columbia, and Ontario), England, Germany, Scotland, and the United States who cooperatively investigated, within their own jurisdictions, the effects of organizational structure, practice environment, and nursing practice on patient outcomes. The international study was directed at registered nurses working in acute care hospitals. In Alberta, the target population consisted of practicing registered nurses working in acute care hospitals within the province. Each nurse in the population had an equal chance of being selected (selection probability). No weighting was needed since a census sample was taken; hence, the weight was set at 1.00. Nurses in healthcare centers or other facilities and in supervisor positions were excluded. The total sample consisted of more than 17,000 nurses in Canada, and 43,000 in the international study, from 415 and 700 hospitals respectively.

In the Alberta study, two data sources were used: (1) The Alberta Registered Nurse Survey and (2) annual hospital discharge databases and hospital facility data files for the period 1991-1998, the latter of which provided information on other organizational factors such as nurse staffing and patient outcomes. For this study, the Alberta Registered Nurse Survey was used to collect data from October 1998 to February 1999. The survey consisted of seven sections: a) employment characteristics, b) nursing work index (NWI), c) Maslach Burnout Inventory (MBI), d) job characteristics and staffing, e) information about the last shift worked, f) demographics, and g) a set of unique Alberta questions on restructuring, workplace violence, and use of information resources.

The 14-page questionnaire (Appendix B) was mailed to each nurse's home address, as listed in the 1998 annual Alberta Association of Registered Nurses (AARN) registry. Included in the census were all 12,345 registered nurses in 129 hospitals across the 17 health regions (at that time) of this province. Three follow-up mailings were carried out using Dillman's survey methods.[84] The University of Alberta Population Research Laboratory (PRL) received, processed, coded, and cleaned the survey responses according to the codebook provided by the nurse survey team and in consultation with the

study investigators. The final usable data consisted of 6,526 nurse surveys (a response rate of 52.8%) from 109 hospitals. The data used in this study was drawn exclusively from the Alberta Registered Nurse Survey.

Present Study

Inclusion Criteria

The sample for this study represents a subset of the 6,526 registered nurses who participated in the Alberta study. The subset was selected based on four inclusion criteria. First, qualifying registered nurses had to be employed in one of the following specialties: medical, surgical, ICU, and emergency. Second, all four specialties in each hospital had to provide respondents. Third, each specialty in every hospital had to provide at least 3 respondents (assigned permanently to that specialty). This last criterion was consistent with the literature. To obtain satisfactory representativeness, Leveck & Jones[169] suggested a minimum response rate of 33% (i.e., three nurse-respondents in their sample) and Verran et al.[286] of 50% (i.e., four nurse-respondents in their study) per specialty in each hospital. Finally, each nurse had to be employed in each specialty at least one year (experience in the unit). This last criterion is relevant to the individual nurse's ability to provide an accurate assessment of organizational culture and nurse specialty subcultures. The literature recommends that each registered nurse have at least three months employment in her/his specialty to participate in a study.[169,286] The rationale for this is that a nurse working in a specialty for, say, one month might not be able to reliably assess the formal or informal practices present in a hospital/specialty. Since the data set of this study did not provide this type of information (number of months in that specialty), adjustments had to be made to the available data. In particular, it was specified that respondents in each specialty had to have at least one year of experience.

Sample

The selection/inclusion criteria resulted in a sample of 1,937 registered nurses (RNs) employed in 12 hospitals. The target population of this study consisted of all registered nurses in Alberta employed in one of the four specialties (n=6,962) at the time of data collection. According to AARN statistics[11] in 1998, the four specialties in Alberta comprised: 2,503 nurses (11.36%) in general medical; 1,894 (8.60%) in general surgical; 1,593 (7.23%) in intensive care units; and 972 (4.41%) in emergency. The percentages in parentheses represent the proportion of nurses in these specialties relative to the total number of nurses in Alberta in the 1998 registry (22,042). The number of nurses in these four specialties represents 31.59% of the total population of registered nurses in Alberta. The sample in the current study was made up of 564 (8.64%) nurses in medical, 608 (9.32%) in surgical, 467 (7.16%) in ICU, and 298 (4.57%) in emergency specialties. The percentages in parentheses represent the proportion of nurses in these specialties relative to the total number of nurses in the original sample (6,526) (Table 4.1). The respondents to the current study and those included in the Alberta population had almost the same likelihood of working in one of the four specialties (29.68% vs. 31.59%).

Table 4.1 - Specialties Included in the Population vs. Original Study vs. Thesis Sample

RN Specialties (NSSCs)	Population – Oct.1st, 1998		AB original study		Thesis sample	
1. Heterogeneous	**N**	**%**	**N**	**%**	**N**	**%**
General Medical	2,503	11.36	905	13.87	564	8.64
General Surgical	1,894	8.60	846	12.96	608	9.32
2. Homogeneous						
Intensive Care Unit	1,593	7.23	619	9.49	467	7.16
Emergency	972	4.41	611	9.36	298	4.57
Total # RNs in specialties	**6,962**	**31.59**	**2,981**	**45.68**	**1,937**	**29.68**
Total # RNs in AB	**22,042**		**6,526**		**6,526**	

Source: AARN Registration Data for Mentorship, 1998

A comparison of the current study's sample (n = 1,937) with the sample of the primary study (n=6,526) is presented in Table 4.2. Over thirteen characteristics, the two samples were similar except the one referring to the shift length. A higher percentage of nurses included in this study were working 12-hour shifts than in the primary study. This is explained due to the certain specialties included in this study, because nurses in the ICU and emergency specialties usually work 12-hour shifts.

Instruments

The data analyzed in this study included variables from the following sections of the survey: employment characteristics, the Nursing Work Index (NWI), the Maslach Burnout Inventory (MBI), job characteristics and staffing, and demographics. The NWI and MBI were used to measure organizational culture and nurse specialty subcultures representing ideational and material cultural manifestations.

Aiken's team at Pennsylvania University has explored the best items suited to distinguishing magnet hospital among American acute care hospitals.[7] Aiken and Patrician[6] revised the NWI (originally developed by Kramer and Hafner[152] and used at the hospital level) and used the modified version, the NWI-R, extensively. However, the NWI has not been used to distinguish units smaller than hospitals, so its ability to distinguish these smaller groups (e.g., subcultures) within hospitals has not been established as of yet. The questions in the NWI were designed to provide ordinal level responses. There is no evidence that respondents have not treated the NWI options as equal-interval markers.[8,118]

The 51 NWI items were classified according to their relevance to either formal or informal practices. The NWI (like all the other questions in the Alberta Registered Nurse Survey) does not contain variables referring to cultural forms or values. Then, I selected four formal practices (i.e., items considered to be relevant to such practices) and three informal practices (i.e., the subscales studied in magnet hospital studies).

Table 4.2 - Characteristics of Primary vs. Secondary Study Sample

Characteristic	Dimension	Primary study (n=6,526)	Secondary (Thesis) sample (n= 1,937)
Gender	Female	97.2	96.3
	Male	2.4	3.3
	Missing	0.4	0.4
Age (years)	Range	21-69	22-65
	Mean	40.89	39.65
	Missing	2.9	1.7
Highest education in nursing	Diploma	76.5	74.8
	Baccalaureate	21.7	23.7
	Master's	0.5	0.6
	Other	1.0	0.6
	Missing	0.8	0.3
Country of basic nursing education	Canada	91.1	91.9
	Other	8.3	7.5
	Missing	1.2	0.5
Dependents leaving with	Yes	63.3	62.9
	No	36.1	36.6
	Missing	0.6	0.5
Employment	Permanent	75	75.6
	Temporary	3	2.4
	Casual	18.7	18.9
	Missing	2.9	3.0
Years work as RN	Mean	16.18	14.93
Years work at present hospital	Mean	10.47	9.73
Years work on current unit	Mean	7.34	6.60
Hours worked per week	Mean	29.40	29.72
Shift length regular scheduled	8 hours	55.6	46.1
	12 hours	33.8	42.0
	8 and/or 12 hours	6.8	8.2
	Other	3.5	3.2
	Missing	0.1	0.2
Hours worked as paid overtime	Mean	2.79	2.56
Hours worked as unpaid overtime	Mean	1.84	1.82

Similarly, I classified the 22 MBI items relevant to emotional concerns according to their affiliation with either patients or work. Then, I selected the emotional exhaustion (EE) subscale (9 items) in the standardized form used in several studies.[3,7] Finally, three dummy variables, representing nurse specialty subcultures, were included in the model. A detailed description of the classification and justification of each NWI and MBI item included in this study is provided in Appendix A.

Reliability and Validity

The NWI and MBI, applied to different institutions by a variety of investigators, have become, over time, standardized instruments. The NWI measures certain characteristics of magnet hospitals.[152] Hence, magnet hospital studies provided evidence for the content validity of the NWI. Aiken and Patrician[6] identified and studied the three subscales of the NWI (i.e., nurse autonomy, control over practice, and nurse-physician relationships), referred to as informal practices. Their published Cronbach's alpha for the entire NWI was 0.96 and for each subscale was 0.75, 0.79, and 0.76 respectively for the individual level data and 0.85, 0.91, and 0.84 respectively for the unit level aggregated data. Estabrooks and associates[95] calculated the inter-item correlations for the three conceptually derived subscales reported by Aiken and Patrician[6] as 0.74, 0.77, and 0.83 for nurse autonomy, control over practice, and nurse-physician relationships respectively. Additionally, Estabrooks and associates,[95] using a 26-item scale, found that the inter-item correlation was 0.93. Moreover, the psychometric properties of the NWI, as published by Aiken and Sloane,[7,8] were reasonable. In Alberta, the Registered Nurse Survey was distributed in a complete census of registered nurses that assures its representativeness.

The NWI has not been used to derive cultural manifestations, making it virtually impossible for me to obtain the opinion of experts as to whether these items are good indicators of organizational culture or subcultures. However, the selection of items designated conceptually as formal practices was checked for face and content validity with two faculty members and an experienced nurse working at a Capital Health hospital. Dr. Karen Golden-Biddle, who has studied the organizational culture literature and is familiar with Martin's[182] work in particular, approved the face validity of the NWI items as cultural manifestations. The construct validity of these items is not easy to assess, since I used indirect NWI-items in a whole new context. However, as Mitchell and Jolley[202] argued, we can have some degree of confidence in construct validity when the measure has good content validity, internal consistency (reliability), and convergent validity in combination with discriminant validity. The external validity of the study refers to the four nurse specialties (medical, surgical, ICU, and emergency) in Alberta, since the sample I used was representative of these specialties.

The Maslach Burnout Inventory (MBI) is a standardized instrument used in numerous studies. In its initial development, the MBI consisted of 47 items, which were administered to 605 individuals.[186] From this instrument, ten factors emerged and, based on a variety of elimination criteria, these were narrowed to four factors (25 items). Finally, the revised instrument was administered to a new sample of 420 individuals. The same four factors emerged, but only three of them had eigenvalues greater than 1. These three factors, composed of 22 items, were used to make up the Maslach Burnout

Inventory, consisting of three subscales (emotional exhaustion, depersonalization or dehumanization, and diminished personal accomplishment).[187] Several subsequent studies using the MBI revealed that the dimensions of burnout are highly correlated. Researchers have also analyzed the convergent and discriminant validity of the scale in a number of ways,[186,187] publishing findings on its construct validity and internal consistency (0.88 in Meier's study).[196] In this study, the internal consistency of the emotional exhaustion subscale in each of the samples (i.e., overall (n=1,937), medical, surgical, ICU, and emergency nurse specialties) was 0.91, except in the ICU sample, which was 0.90.

Choosing Structural Equation Modeling (SEM)

The principal analytic method of the study was structural equation modeling with LISREL, an acronym for the analysis of LInear Structural RELations. I specified and tested a series of causal models linking concepts to the empirical and measurable world. SEM through LISREL has several advantages. The primary strength of LISREL is its ability to integrate concepts and observed indicators into a structural equation model[120] in which the relationships among the variables can be more critically evaluated. Additionally, complex relationships can be examined simultaneously.[266] Second, in SEM, unlike in multiple regression, ANOVA or MANOVA, the relationships among variables are presumed to be free of measurement error because the error has been estimated and removed from the variance of each variable. Hence, the reliability of measurement is explicitly provided for within the analysis. Third, the LISREL technique provides information about model parameters that need re-specification in order to improve the fit of the model.[140] Finally, LISREL has the potential to evaluate existing indicators of the concepts in order to identify them as poor measures, to exclude them from the model, or adequate measures, to include them within it.

Power estimation in SEM has not yet been adequately tested, but the minimum sample size required in SEM is commonly calculated from the number of variables involved in the model under study. Tabachnick and Fidell[266] recommended, as a rule of thumb, 10 cases per estimated parameter, while Burns & Grove[45] suggested 30 cases for each studied variable. The current model consists of 16 variables (13 exogenous and 3 endogenous) and contains 30 estimated parameters. According to the less conservative rule of thumb, the minimum desired sample size was estimated to be 16 variables x 30 cases per variable = 480 cases (240 for model development and 240 for model testing). The fact that the sample size (n=1,937) was larger than the minimum desired number of cases does not pose a problem in SEM. Hayduk,[120] based on his experience, maintained that a larger N is preferable. He argued that, with a large sample size, "even trivial departures between Σ and S can be significant, but if N is small, χ^2 may have insufficient power to detect substantial differences" (p.168). That is, larger samples are more likely to yield statistically significant structural coefficients in order to validate the model. Similarly, both Tabachnick and Fidell[266] and Burns and Grove[45] argued that larger sample sizes are to be preferred over smaller ones because they reduce the risk of Type II error, which is a major concern given the importance of theory development. To test a model with LISREL, the data set is commonly split in half. Fifty percent (50%) of the cases (i.e., n=971) are used for model development (explanatory data analysis), while the other 50% (i.e., n=966) are reserved for model testing (confirmatory data analysis).[120,266] This

strategy reduces the probability of committing a Type I error, that is, rejecting a true null hypothesis due to chance sampling fluctuation. Using two samples (first and second half of the sample) for running the model reduces the probability of obtaining a non-significant chi-square (at p-value of 0.05), which means that the S and Σ matrices would appear to be similar, when in fact their differences are due to sampling fluctuation.

The pattern of missing values in the variables included in the model was random. In general, both listwise and pairwise techniques are used to eliminate missing cases of the model variables, but SEM users usually prefer pairwise deletion for two reasons. First, more data remain for use in calculations (larger sample size),[266,290] and, second, participants (i.e., cases) who did not respond to all questions (for a reason) are not penalized but remain in the sample. Usually, social science studies "use" the available respondents to measure social phenomena, probably because the non-respondents in all questions provide the true population values. Non-responding may mean that respondents were not interesting on the topic, which is a kind of measuring the studied social phenomenon. On the other hand, listwise deletion assumes that maximum likelihood estimates are based on a covariance matrix created by the values of all variables included in the model in each individual case. The listwise covariance matrices might reflect unrealistic social situations, since selecting only those who respondent in all questions, it may means that these individuals represent a group of people who are polite or compliant to answer all questions. Nevertheless, pairwise matrices due to the violation of the listwise matrix assumption may cause estimation problems that involve unknown costs.[120] In this study, I used both listwise and pairwise deletion of missing cases, using the SPSS program to estimate the covariance matrices (and correlations) between the indicators of the final models. In the end, I reported the findings based on the pairwise selection of variables and any differences between the two techniques.

Comparing SEM with other methods of statistical analysis (e.g., multiple regression, analysis of variance, and hierarchical linear modeling), the superiority of structural equation modeling in testing theories is obvious. *Multiple regression* analysis is used to predict one dependent variable based on several independent variables and to estimate each independent variable's relative contribution to the prediction of the dependent variable. Multiple regression reveals relationships among variables, but does not imply any causality. Another limitation of regression analysis is its sensitivity to the combination of independent variables it includes. Further, regression analysis assumes that independent variables are measured without error, which can never be the case, especially in social and behavioral studies.

ANOVA compares means to find any reliable differences among them. However, it neither clarifies the groups that the differences are between, nor the degree of difference. *MANOVA* tests the effects of different types of treatment (independent variables) on several dependent variables. That is, it tests, by comparing variances, whether mean differences among groups on a combination of dependent variables are likely to have occurred by chance. *SEM* estimates simultaneously total and indirect effects, while hypotheses related to the model can be tested as well. Further, SEM is similar to randomized clinical trials (RCTs) in that SEM provides evidence of causal relationships

among variables. Although causation is not necessarily a property of the real world, it is part of human beings' abstract conceptual system.[120] SEM with LISREL in a way preserves the distinction between concepts and indicators, and thus, it suites the needs of the social sciences. In terms of the three main characteristics of causality (contiguity between the presumed cause and effect, precedence of cause to effect in time, and constant conjuction between cause and effect), SEM takes into consideration all of them, even though time is not part of the SEM equations but implied.

Hierarchical linear modeling (HLM) was developed to fill the gaps arising from several limitations (e.g., aggregation bias, "unit of analysis", and "measurement of change" problems) in conventional statistical techniques. Moreover, HLM refers to a hierarchical data structure that is common in social research. Usually, hierarchical data includes information about several units of analysis (nested data) such as the characteristics of individuals and groups. HLM can test hypotheses about relationships occurring at each level and across levels of nested data and further assess the amount of variation at each level. In HLM, sub-models represent each of the levels of the nested structured data. These sub-models express relationships among variables within a given level and specify how variables at one level influence relationships occurring at another level. However, I chose not to use HLM because, first, the structure of my data was not nested in levels, and, second, I was not interested in assessing the amount of variation at each level that accounted for the variance of outcomes. Structural equation modeling also has the advantage of simultaneously estimating the direct, indirect, and total effects of exogenous on endogenous variables.

Data Analysis

Analyses were conducted on an IBM-compatible personal computer using the Statistical Package for Social Sciences (SPSS) for Windows version 10.00[258] for descriptive and inferential statistics. LISREL 8.5[134] was used for all model estimations. Statistics Canada guidelines[259] relating to the rounding of the estimates, sample weighting for tabulation, estimation and variance calculation procedures, and sampling variability guidelines for release and publication were followed.

Model Specification

Data analysis consisted of three steps: model specification, model estimation, and goodness-of-fit assessment. Prior to the LISREL analyses, descriptive statistics were produced and internal consistency reliability analysis of subscales (three informal practices and emotional concerns) were conducted for identification of the univariate characteristics of the indicators. Frequencies, means, standards deviations, cross-tabulations, and scatter-plots of all variables were computed to assess potential outliers. Finally, Cronbach's alphas for the four subscales (i.e., autonomy, control over practice, RN-MD relationships, and emotional exhaustion) included in the models were computed for the sample in order to gain insight into the data. The corresponding alpha values were 0.61 (3 items), 0.66 (5 items), 0.75 (2 items), and 0.91 (9 items).

Model Estimation

The estimation step involves estimating the variance for each indicator as the product of each indicator's variance multiplied by the assigned proportion of error for that particular indicator. In this way, the theta epsilon ($\Theta\varepsilon$) and theta delta ($\Theta\delta$) matrices were obtained. Next, Pearson correlation matrices for all study variables were obtained to test for potential of multicollinearity. Variables with correlation at or above the criterion level of 0.90,[266] or even at the more rigid level of 0.85,[238] were not retained in the model due to potential problems with respect to identification. Also, variance/covariance matrices between the indicators were estimated.

Prior to the structural equation analysis, I checked whether the assumptions (i.e., multivariate normality, non-multicollinearity, and independence of residuals)[120] of causal modeling analyses were met. Also, the reliability and validity of the NWI and MBI instruments (Cronbach's alpha, intra-class correlation) were tested. Finally, I ran the LISREL program to assess the study models. There are several approaches in running LISREL analyses (e.g., ordinary least squares, maximum likelihood estimation). I chose, for two reasons, the maximum likelihood estimation (MLE) method to obtain mathematical estimates of all matrices. First, because MLE is "the most broadly applicable procedure"[120] and I am familiar with this approach. Second, because MLE maximizes the likelihood that the discrepancy between theoretical and observed data could have arisen as a mere sampling fluctuation, which means that MLE selects the best guess values for the structural coefficients.

Assessment of Goodness-of-Fit

The third step refers to the assessment of the model's goodness-of-fit. A comparison of the variance and covariance matrices of the implied (Σ) and observed (S) models is used to test the "fit" of the model. Criteria for evaluating goodness-of-fit include the following measures assessing the overall fit of the model to the data: chi-square (χ^2), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), comparative fit index (CFI), root mean squared residual (RMR), and other new indices that are being developed every day.[120,134,266]

The χ^2 test can be interpreted as measuring the differences between the hypothesized model (Σ) and the observed one based on the data (S). It is actually a badness-of-fit index[134] since smaller values indicate a better fit. Thus, low non-significant values of χ^2 are desirable, indicating a good model fit. The chi-square is sensitive to sample size. With a large sample size, the chi-square increases more than expected due to specification error in the model. That is, trivial differences between the Σ and S covariance matrices are often significant because they are multiplied by N-1, leading to a significant chi-square. According to a very rough rule of thumb, a good fitting model is one in which the ratio of chi-square to the degrees of freedom is less than 2. If the obtained value of chi-square is large compared to the number of degrees of freedom, then the fit must be examined by other indices. These indices would include the fitted residuals (the differences between the sample correlation matrix and the fitted matrix), the standardized residuals (the fitted residuals divided by the large sample standard error of the residual), and the modification indices (associated with the fixed and constrained parameters of the model). The

modification indices approximate the overall chi-square value, which would decrease if a particular parameter were freely estimated.

The goodness-of-fit index (GFI) is not a function of sample size, but its distribution depends on the sample size. The adjusted goodness-of-fit index (AGFI) is the GFI adjusted to degrees of freedom. AGFI values closer to 1 (Hayduk, personal communication in Winter 2001) are desirable. The comparative fit index (CFI) assesses fit relative to other models, but it uses the non-central chi-square distribution with non-centrality parameters. CFI values greater than .90 indicate a good fitting model. The root mean squared residual (RMR), an index based on residuals, perfectly describes the model fit. RMR measures the differences between the sample and the estimated population variances and covariances. Good fitting models have a small RMR. If the model is not a good fit, parameters can be added or eliminated according to modification indices and the model can then be rerun to achieve a better fit. This procedure is referred to as re-specification.

The overall statistic (χ^2) can tell us that a model does not fit the data well, but does not specify the reasons why or which parts of the model are incorrect. Usually, all the goodness-of-fit indices produce consistent results; which indices to report is a matter of researcher preference. Often multiple indices are reported. In this case, I opted to report the chi-square (χ^2), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), and the comparative fit index (CFI).

Stacked Model for Multiple Groups

LISREL is the most widely available program for estimating structural equation modeling for a variety of models that include multiple-group analyses. If we suspect that the modeled concepts are involved in several *interactions*, and each group is clearly defined (i.e., the groups are mutually exclusive), then stacking multiple groups of data is appropriate. Stacking multiple groups together allows estimation of models that contain multiple interactions between the variable based on which groups are stacked and the other variables included in the model. Stacking multiple groups together, which is rarely seen, allows some structural coefficients to be fixed or constrained (e.g., to be equal) among the groups, while other effect coefficients are allowed to vary. This approach results in reclaiming *extra degrees of freedom* that increase the testing power of the model. In this study, I developed two competing models; one including the four nurse specialties as a homogeneous group, and another, in which the four specialties were assessed separately but simultaneously. In Chapter 6, for reasons to be described in detail at that time, I report on a "stacked model" representing the four nurse specialty subcultures. Briefly, I used the stacked model because, first, I suspected that the original model (in chapter 5) displayed differential effects in the different groups, and second, because I needed extra testing power for the model (more degrees of freedom).

Ethical Considerations

This study was based on a secondary analysis of an existing University of Alberta data set. The Alberta data file contains no identifying characteristics of individuals. The original study did not refer to any vulnerable populations nor does it deal with

sensitive/special issues. Neither nurses nor hospital identity could be recognized in any way from the study data. The respondents were nurses who reported on their work environment characteristics and on nurse professional life. In this study, I dealt with aggregate work environment characteristics on a nurse specialty level, not with individual nurse responses. Ethical approval was attained from the Health Research Ethics Board (HREB) of the University of Alberta prior to initiating the study.

Chapter 5
Model I (Modeling NSSC as a variable)

In this chapter, the univariate statistics of the original model (Model I) and the structural coefficients of all sixteen indicators are described briefly. The conceptual and statistical models used in this study were analytically described in chapters 3 and 4 respectively. The findings reported here refer to the model in Figure 5.1.

Univariate Description of the Indicators in the Original Model

A univariate description of all the indicators (three endogenous and thirteen exogenous variables) included in the original model or Model I is presented in Table 5.1. These statistics are based on the randomly chosen first half split of the data subset (AB-Split1, n=971), which was used to develop Model I. As mentioned in chapter 4, the data were randomly divided in half in order to use the first half subset in developing the model. The second half subset (AB-Split2, n=966) was reserved for testing and appraising the final model in the unused data set. Based on skewness and kyrtosis information (Table 5.1), the variables are normally distributed, and I assumed that all variables included in the model are normally distributed as well (multiple normal distributions).

The Covariance Matrix

The covariance matrix for the original model was obtained using pairwise deletion of the missing values (SPSS 10.0). The sample size ranged from 900 to 971. The mean effective sample size was 947 cases, which was used to run the LISREL program. The missing values for the variables ranged from 0% to 3.4% (adverse patient events). The correlation, variance, and covariance matrices are depicted in Table 5.2, and the indicator measurements in Table 5.3. The sets of syntax used to run the original and final models (Syntax 5.1 and Syntax 5.2 respectively) are illustrated in Appendix C.

Model Estimation, Fit, and Modifications

I used the maximum likelihood estimation (MLE) method to obtain the parameters in this study. The model fit was assessed based on the chi-square (χ^2), the goodness of fit index (GFI), the adjusted goodness of fit index (AGFI), the size of the standardized residuals, and other parameters such as the Q-plot. The model converged after fourteen iterations. The goodness-of-fit test statistic, chi-square (χ^2), used to evaluate the SEM null hypothesis, is equal to the product of minimized F and the sample size (N-1). In this model, the null hypothesis is that the Sigma (Σ) matrix (variance/covariance matrix based on my theory) is within random sampling fluctuation of the "S" matrix, which is the variance/covariance matrix based on the collected data. In other words, if the "Σ" and "S" matrices are close to each other, then the chi-square is small, and the p-value is large, in order not to reject the null hypothesis. The original model resulted in a statistically non-significant chi-square (χ^2=4.556, p=0.207) with 3 degrees of freedom (df). This probability value is larger than 0.05 and therefore I concluded that the model, even though it has only three degrees of freedom (df = 3), fits the data reasonably well. The Goodness of Fit Index (GFI) was 0.999, and the Adjusted Goodness of Fit Index (AGFI) was 0.973, which is above the minimum desirable value of ~0.96 (Hayduk, personal communication, Winter 2001).

Figure 5.1 – Model I: Nurse Specialty Subcultures & Nurse and Patient Outcomes (all exogenous variables covary)

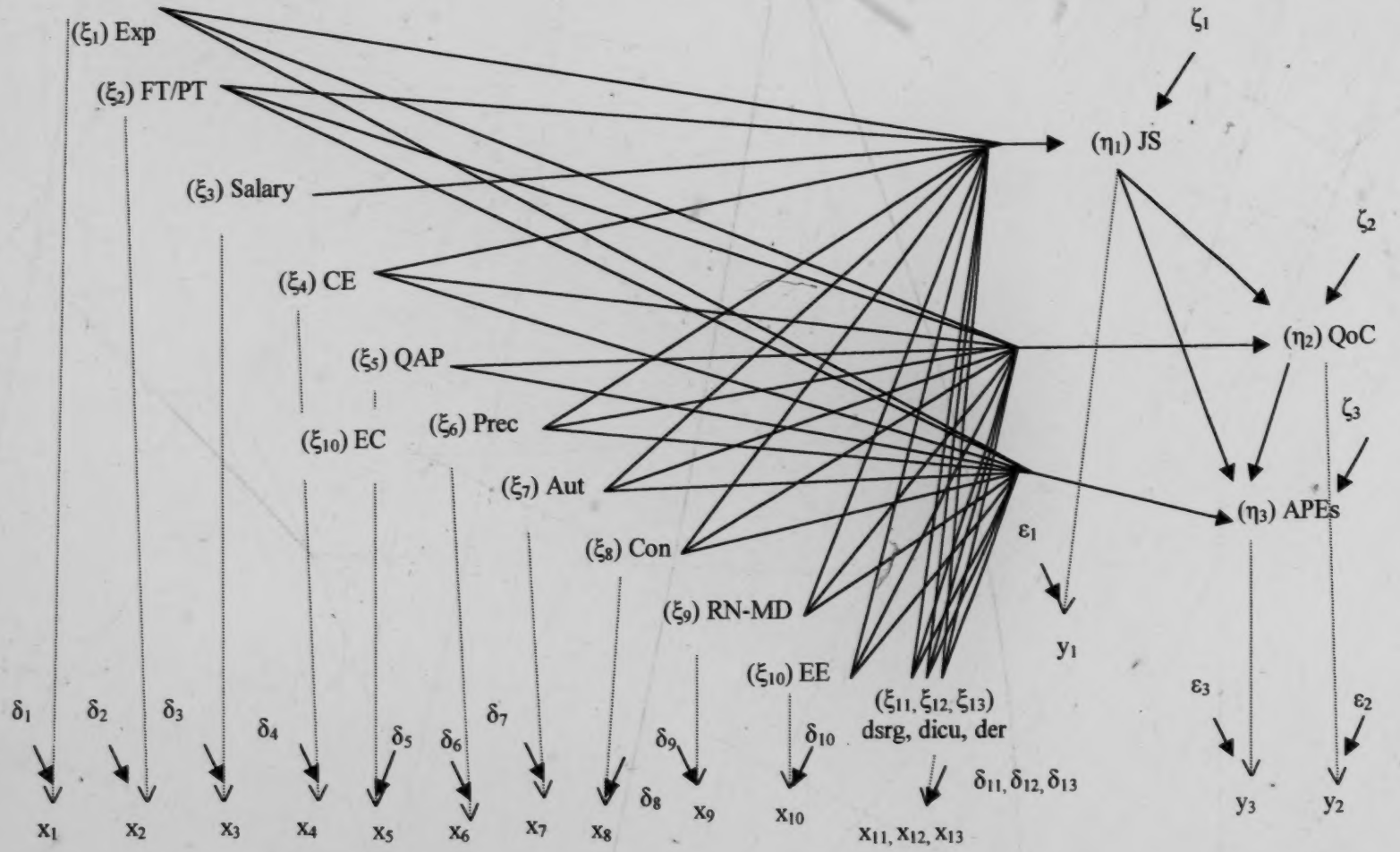


Table 5.1. – Model I: Statistics for the Indicators

Indicators*	Mean	SD	Skewness	Kyrtosis
JS (y1)	2.830	0.830	-0.520	-0.125
QOC (y2)	3.261	0.635	-0.355	-0.320
APEs (y3)	2.204	0.961	-0.907	-0.347
Exp (x1) (Range: 1-32)	6.717	5.499	1.213	1.202
FT/PT (x2)	1.205	0.404	1.467	0.151
Salary (x3)	2.719	0.835	-0.524	-0.187
CE (x4)	2.366	0.899	-0.061	-0.867
QAP (x5)	2.547	0.773	-0.280	-0.325
Prec (x6)	2.674	0.957	-0.329	-0.807
Aut (x7)	7.919	1.677	-0.312	0.106
Con (x8)	12.564	2.842	-0.010	-0.211
RN-MD (x9)	5.706	1.310	-0.420	0.348
EE (x10)	22.615	11.011	0.382	-0.384
NSSCs (x11)				

*Explanation of indicators' names:
JS (y1): job satisfaction
QOC (y2): quality of care
APEs (y3): adverse patient events
Exp (x1): experience
FT/PT (x2): full-time/part-time
Salary (x3): satisfactory salary
CE (x4): continuing education program
QAP (x5): quality assurance program
Prec (x6): preceptorship program
Aut (x7): professional autonomy
Con (x8): control over practice
RN-MD (x9): relationships between nurses and physicians
EE (x10): emotional exhaustion
NSSCs (x11): three dummy variables (i.e., dsrg, dicu, der) for surgical, icu, and emergency specialties respectively. Medical (dmed) is the reference specialty.

Table 5.2. - Model I: Correlations*, Variances**, and Covariances*** Matrices (Pairwise)

	JS	QOC	APEs	Exp	FT/PT	Salary	CE	QAP	Prec	Aut	Control	Relation	EE	DSurg	Dicu	Der
JS	0.690	0.326	-0.076	-0.004	-0.006	0.226	0.234	0.235	0.191	0.366	0.420	0.296	-0.580	-0.013	0.157	-0.071
QOC	0.172	0.403	-0.134	0.002	0.016	0.133	0.161	0.248	0.170	0.310	0.465	0.270	-0.323	-0.034	0.243	-0.152
APES	-0.061	-0.082	0.924	-0.056	-0.049	0.011	-0.041	-0.093	-0.053	-0.073	-0.046	-0.094	0.095	0.071	-0.152	-0.124
Exp	-0.019	0.007	-0.291	30.240	0.013	0.004	-0.013	0.044	0.032	-0.022	-0.055	0.010	-0.050	0.028	0.022	0.086
FT/PT	-0.002	0.005	-0.023	0.036	0.242	0.106	0.085	0.075	-0.004	0.051	0.053	-0.036	-0.148	0.072	-0.126	0.004
Salary	0.156	0.070	0.009	0.018	0.044	0.697	0.198	0.120	0.012	0.279	0.309	0.185	-0.280	0.020	0.059	-0.103
CE	0.174	0.092	-0.035	-0.063	0.037	0.148	0.809	0.351	0.209	0.348	0.353	0.230	-0.237	0.040	-0.034	0.059
QAP	0.150	0.121	-0.069	0.185	0.028	0.077	0.244	0.598	0.194	0.364	0.369	0.222	-0.247	0.026	0.034	-0.028
Prec	0.152	0.103	-0.049	0.168	-0.002	0.009	0.180	0.143	0.915	0.239	0.244	0.191	-0.209	-0.037	0.155	0.011
Aut	0.508	0.331	-0.117	-0.204	0.042	0.391	0.528	0.473	0.385	2.813	0.577	0.420	-0.407	-0.021	0.120	-0.106
Control	0.992	0.838	-0.125	-0.852	0.075	0.733	0.902	0.814	0.669	2.744	8.076	0.365	-0.483	0.005	0.177	-0.171
Relation	0.322	0.226	-0.118	0.076	-0.023	0.203	0.271	0.224	0.241	0.926	1.355	1.717	-0.260	-0.130	0.172	0.111
EE	-5.318	-2.252	1.005	-3.008	-0.805	-2.555	-2.329	-2.090	-2.193	-7.465	-15.148	-3.786	121.245	-0.007	-0.193	0.132
DSURG	-0.005	-0.010	0.032	0.072	0.017	0.008	0.017	0.009	-0.017	-0.016	0.007	-0.080	-0.038	0.218	-0.378	-0.293
DICU	0.055	0.065	-0.062	0.050	-0.026	0.021	-0.013	0.011	0.063	0.085	0.214	0.095	-0.900	-0.075	0.178	-0.234
DER	-0.021	-0.035	-0.043	0.171	0.001	-0.031	0.019	-0.008	0.004	-0.064	-0.176	0.053	0.525	-0.049	-0.036	0.130

*Correlations: above the diagonal
**Variances: diagonal
***Covariances: below the diagonal

Table 5.3. - Model I: Indicators' Measurement

Concepts	Indicators		Assessed proportion of error variance	Variance	Values
Eta (η1)	Nurse Job Satisfaction	y1	0.05	0.690	0.034
Eta (η2)	Quality of Care	y2	0.1	0.403	0.040
Eta (η3)	Adverse Patient Events	y3	0.2	0.924	0.185
Ksi (ξ1)	Experience	x1	0.01	30.240	0.302
Ksi (ξ2)	Full-time / Part-time	x2	0.01	0.242	0.002
Ksi (ξ3)	Salary	x3	0.05	0.697	0.035
Ksi (ξ4)	Continuing Education	x4	0.05	0.809	0.040
Ksi (ξ5)	Quality Assurance Program	x5	0.05	0.598	0.030
Ksi (ξ6)	Preceptor	x6	0.05	0.915	0.046
Ksi (ξ7)	Autonomy	x7	0.1	2.813	0.281
Ksi (ξ8)	Control	x8	0.1	8.076	0.808
Ksi (ξ9)	Relations RN-MD	x9	0.1	1.717	0.172
Ksi (ξ10)	Emotional exhaustion	x10	0.05	121.245	6.062
Ksi (ξ11)	Surgical dummy variable (dsurg)	x11	0.01	0.218	0.002
Ksi (ξ12)	ICU dummy variable (dicu)	x12	0.01	0.178	0.002
Ksi (ξ13)	Emergency dummy variable (der)	x13	0.01	0.130	0.001

Another criterion to test the fit of the model is to calculate the variance and standard deviation of the chi-square distribution. The variance of the chi-square distribution is the number of degrees of freedom multiplied by two. In this model, the variance is 3 x 2 = 6. The standard deviation is the square root of the variance, which in this case is the square root of 6 = 2.45. The mean of the chi-square distribution is its degrees of freedom: 3. Two standard deviations would be approximately: 2 x 2.45=4.90 ~ 5. Within two standard deviations, the chi-square should be 3+5=8. Therefore, the chi-square should be less than 8 in order that the model fit the data. The above indices suggested that the model fit the data well. This indicates that the differences between the model-implied covariance matrix (Σ) and the covariance matrix from the observed data (S) were small enough to be considered as sampling fluctuation.

Next, I examined the output to identify sources for any modification that might improve the fit of the model. Specifically, I examined the standardized residuals, the best and most important criterion for diagnostics in structural equation modeling. I found that *none* of the standardized residuals exceeded an absolute value of 2.0 (two standard deviations from zero difference, which is the mean of the distribution of the standardized residuals). This suggests that the differences between the observed and implied covariance matrices are more likely to be due to random error.[120] In this model, the smallest standardized residual was –1.781 in the covariance between "continuing education" and "salary". The largest standardized residual was 1.894 in the covariance between "experience" and "salary". The examination of the modification indices suggested freeing the effect from "salary" to "quality of care", which is neither logical nor based on a theory. In spite of this, I proceeded to free the effect from "salary" to "quality of care" to examine the improvement in the model. Further examination of the normal quantile plot (i.e., Q-plot), which is another visual form of the distribution of the standardized residuals, showed that the residuals formed an almost vertical line (slope), indicating a good model fit. These parameters did not present sufficient reason for any other modifications to the model. No other diagnostic data suggested the need for further changes.

After freeing the effect from "salary" to "quality of care", the model resulted in a statistically non-significant chi-square (χ^2=2.007, p=0.367) with 2 degrees of freedom (df). This model, even though it has only two degrees of freedom (df = 2), fits the data reasonably well. The Goodness of Fit Index (GFI) was 1.000 and the Adjusted Goodness of Fit Index (AGFI) was 0.982. The effects reported next are based on this analysis (freeing the effect from "salary" to "quality of care").

Un-standardized and Standardized Structural Effects

Table 5.4 presents the findings in the original and final model. These findings include the un-standardized and standardized beta and gamma matrices, and the squared multiple correlations for the structure equations (R^2) for each of the three endogenous variables (i.e., job satisfaction, quality of care, and adverse patient events). The findings in the two models (original and final) were quite similar. The signs in all these effects were in the direction that I had expected, both intuitively and based on the literature.

Table 5.4. – Original & Final Model I: Un-standardized & Standardized Beta & Gamma Matrices

Original Model I: Un-standardized Beta & Gamma Matrices

	Beta		Gamma													R^2 (%)
	JS	QOC	Exp.	FT/PT	Salary	CE	QAP	Prec	Aut	Con	RN-MD	EE	dsrg	dicu	der	
JS	--	--	-0.004	-0.153**	0.026	0.036	--	0.020	0.022	0.030*	0.058*	-0.038**	0.023	0.028	0.045	42.4
QOC	0.086*	--	0.002	0.016	--	-0.026	0.060	0.011	-0.017	0.087**	0.047*	-0.001	0.011	0.192**	-0.101	32.0
APEs	-0.002	-0.202**	-0.004	-0.113	--	0.010	-0.085	0.011	-0.031	0.035	-0.001	0.004	-0.141	-0.472**	-0.559**	10.5

Final Model I: Un-standardized Beta & Gamma Matrices

	Beta		Gamma													R^2 (%)
	JS	QOC	Exp.	FT/PT	Salary	CE	QAP	Prec	Aut	Con	RN-MD	EE	dsrg	dicu	der	
JS	--	--	-0.004	-0.135**	0.027	0.036	--	0.020	0.022	0.030*	0.058*	-0.038**	0.023	0.028	0.045	42.4
QOC	0.087*	--	0.002	0.021	-0.039	-0.023	0.057	0.007	-0.015	0.089**	0.048*	-0.001	0.010	0.191**	-0.107	32.3
APEs	-0.002	-0.202**	-0.004	-0.113	--	0.010	-0.085	0.011	-0.031	0.035	-0.001	0.004	-0.141	-0.472**	-0.559**	10.5

Original Model I: Standardized Beta & Gamma Matrices

	Beta		Gamma													R^2
	JS	QOC	Exp.	FT/PT	Salary	CE	QAP	Prec	Aut	Con	RN-MD	EE	dsrg	dicu	der	
JS	--	--	-0.026	-0.093**	0.027	0.039	--	0.023	0.043	0.100*	0.089*	-0.508*	0.013	0.014	0.020	As
QOC	0.115*	--	0.020	0.013	--	-0.038	0.075	0.017	-0.044	0.388**	0.096*	-0.014	0.008	0.134**	-0.060	abo
APEs	-0.002	-0.141**	-0.022	-0.065	--	0.010	-0.074	0.012	-0.057	0.111	-0.001	0.051	-0.076	-0.230**	-0.233**	ve

Final Model I: Standardized Beta & Gamma Matrices

	Beta		Gamma													R^2
	JS	QOC	Exp.	FT/PT	Salary	CE	QAP	Prec	Aut	Con	RN-MD	EE	dsrg	dicu	der	
JS	--	--	-0.026	-0.093**	0.027	0.039	--	0.023	0.043	0.100*	0.089*	-0.508**	0.013	0.014	0.020	As
QOC	0.117*	--	0.021	0.017	-0.052	-0.033	0.072	0.011	-0.038	0.398**	0.100*	-0.020	0.008	0.133**	-0.064	abo
APEs	-0.002	-0.142	-0.022	-0.065	--	0.010	-0.074	0.012	-0.057	0.111	-0.001	0.051	-0.076	-0.230**	-0.233**	ve

*Significant effect >2.0 SD **Significant effect >3.0 SD

JS: job satisfaction
QOC: quality of care
APEs: adverse patient events
Exp: experience
FT/PT: full-/part-time
Salary: satisfactory salary
CE: continuing education
QAP: quality assurance program
Prec: preceptorship
Aut: autonomy
Con: control over practice
RN-MD: nurse-physician relations
EE: emotional exhaustion
dsrg: surgical
dicu: ICU
der: emergency

Full-time/part-time employment (FT/PT) contributed to nurse job satisfaction (JS). Nurses employed part-time experienced less (-0.93) job satisfaction compared with their full-time counterparts.

Control over practice (Con) influenced nurse job satisfaction (JS) and quality of provided nursing care (QoC). For every unit increase in nurses' control over practice, their job satisfaction and quality of care increased by 0.100 and 0.398 units respectively. A one-unit change in a variable can be interpreted as a change of one standard deviation, since, for convenience reasons, each variable was re-scaled (standardized) from its original scale to a scale with mean 0 and variance (standard deviation) 1.0.

The relationships between nurses and physicians (RN-MD) were associated with both job satisfaction (JS) and quality of care (QoC). For every unit increase in better relationships, nurses' job satisfaction and quality of care increased by 0.089 and 0.100 units respectively.

Emotional exhaustion (EE) contributed negatively to job satisfaction (JS). For every unit increase in nurses' emotional exhaustion, job satisfaction decreased by 0.508 units.

Nurse specialties (NSSCs) were associated with quality of care (QoC) and adverse patient events (APEs). In ICU, the quality of care was better by 0.133 units and adverse patient events were fewer by 0.230 units than in the medical specialty. In emergency, the adverse events were fewer by 0.233 units than in the medical specialty.

Finally, job satisfaction (JS) contributed to quality of care (QoC), which in turn is negatively associated with adverse patient events (APEs). For every unit increase in job satisfaction, quality of care increases (becomes better) by 0.117 units. Then, for every unit increase in quality of care, adverse patient events decrease by 0.142 units.

Overall, formal practices did not affect job satisfaction, while informal practices (i.e., control over practice, nurse-physician relationships) influenced both job satisfaction and quality of care. These findings support the commonly held belief that contol over practice and nurse-physician relationships have influential effects on outcomes. A significant implication of this is that formal practices are generally more costly to implement than changes in informal practices.

Squared Multiple Correlations for Structural Equations (R^2)

In this model, the squared multiple correlations for structure equations (R^2) were 0.424 for Eta 1 (job satisfaction), 0.323 for Eta 2 (quality of care), and 0.105 for Eta 3 (adverse patient events). The proportions of explained variance for the corresponding concepts by predictor variables were 42.4%, 32.3%, and 10.5% respectively. These proportions of explained variances are noteworthy, considering that this model is parsimonious and includes only the available predictor variables. The proportion of the explained variance for adverse patient events (10.5%), the endogenous concept of primary interest in this study, was relatively small, even though the model showed a marginal fit, which is probably the problem. The squared multiple correlations for Y-variables were 0.951 for

"job satisfaction", 0.901 for "quality of care", and 0.800 for "adverse patient events". These values are reasonable, since I entered a 5% error for "job satisfaction", 10% for "quality of care", and 20% for "adverse patient events".

Listwise deletion - Second half split – Sensitivity analysis

I also used listwise deletion of missing values, for these two runs, in order to describe any potential similarities and/or differences in relation to the original model. I made use of an effective sample size of 819 cases, which were used to run the LISREL program. The model, after ten iterations, resulted in a statistically non-significant chi-square (χ^2=1.272, p=0.736) with 3 degrees of freedom (df), which means that the model fits the data well (better than with pairwise deletion). The Goodness of Fit Index (GFI) was 1.00 and the Adjusted Goodness of Fit Index (AGFI) was 0.991. The squared multiple correlations for structure equations (R^2) were 43.7%, 33.7%, and 10.9% for "job satisfaction", "quality of care", and "adverse patient events" respectively. The structural coefficients were similar in size with the models run with pairwise deletion. The sets of syntax that used to run the original (Syntax 5.3) and the final (Syntax 5.4) models with listwise deletion are illustrated in Appendix C. Similarly, I ran the two models (original and final) with both pairwise and listwise deletion of missing values in the second half split data set (AB-Split2) that was reserved for testing the models. The findings were similar to the results in the first half split subset (AB-Split1). A sensitivity analysis was also conducted for the measurement error specifications by first halving and then doubling each fixed error term, one error term at a time. There were neither differences in model fit for any of the twenty-six modifications, nor major changes in the effects.

Summary

In summary, in Chapter 5 I tested a model in a non-homogeneous population making use of dummy variables that represented nurse specialty subcultures. Model I fit the data reasonably well, that is, the hypothesized and observed effects had small, non-significant differences. The model explained a relatively small portion of the variance in adverse patient events, which might be due to the questionable components making up "adverse patient events". As expected, several cultural manifestations, specifically informal practices and emotional concerns, influenced job satisfaction and quality of care, but not adverse patient events. Quality of care, however, affected adverse patient incidents.

Five key findings emerged from Model I. First, among the demographic characteristics, only "full-/part-time" played a role in "job satisfaction". That is, nurses who were employed part-time were less satisfied (the strongest negative impact on "job satisfaction"). Second, none of the formal practices had a significant effect on "job satisfaction", "quality of care" or "adverse patient events". Third, among the informal practices, "control over practice" and "nurse-physician relationships" were associated with "job satisfaction" and "quality of care". That is, nurses who reported higher levels of both variables (i.e., more control over practice and better relationships) had higher levels of "job satisfaction" and also provided a higher quality of care. Fourth, emotional exhaustion has a negative impact on "job satisfaction". Finally, the ICU specialty had significantly better quality of care than did the medical specialty. Both ICU and emergency had fewer adverse patient events than did the medical specialty.

On the other hand, several effects expected to be significant were non-significant, a topic that will be discussed in-depth in chapter 7. In addition, a disturbing outcome of Model I was the failure of formal practices, under either pairwise or listwise techniques, to significantly influence any of the endogenous variables. These phenomena can be explained based on contradictory effects across these subcultures. Model I, based on structural modeling, refers to the overall sample consisting of nurses employed in four specialties (n=1,937). However, there are two methods for evaluating different effects across two or more groups: each group can be modeled with a separate LISREL run or these groups can be stacked together for a simultaneous estimation. By comparing the means of each variable and by controlling as equal all other effects across the four specialties, I found evidence of differences among the four specialties in the differential effects of the dummy variables. This, however, was an indication of potential differences. Further analysis on a stacked model illuminated these differences.

Chapter 6
Model II or Four-Group Stacked Model

In Model I, "experience", "salary", "continuing education", "preceptorship", and "autonomy" did not have significant effects on "job satisfaction", "quality of care" or "adverse patient events". There are many different possible explanations for these results, since each effect would be expected to interact in several different ways within each specialty. For example, if nurses in one specialty are older, this will have an impact on the results. Each causal variable will have different effects across different specialties, that is, nurse specialties may have different operative causal effects. Having different conceptions of the variables included in the model, nurses working in each of these four groups may also put a different emphasis on the relationships between each causal variable and outcomes.

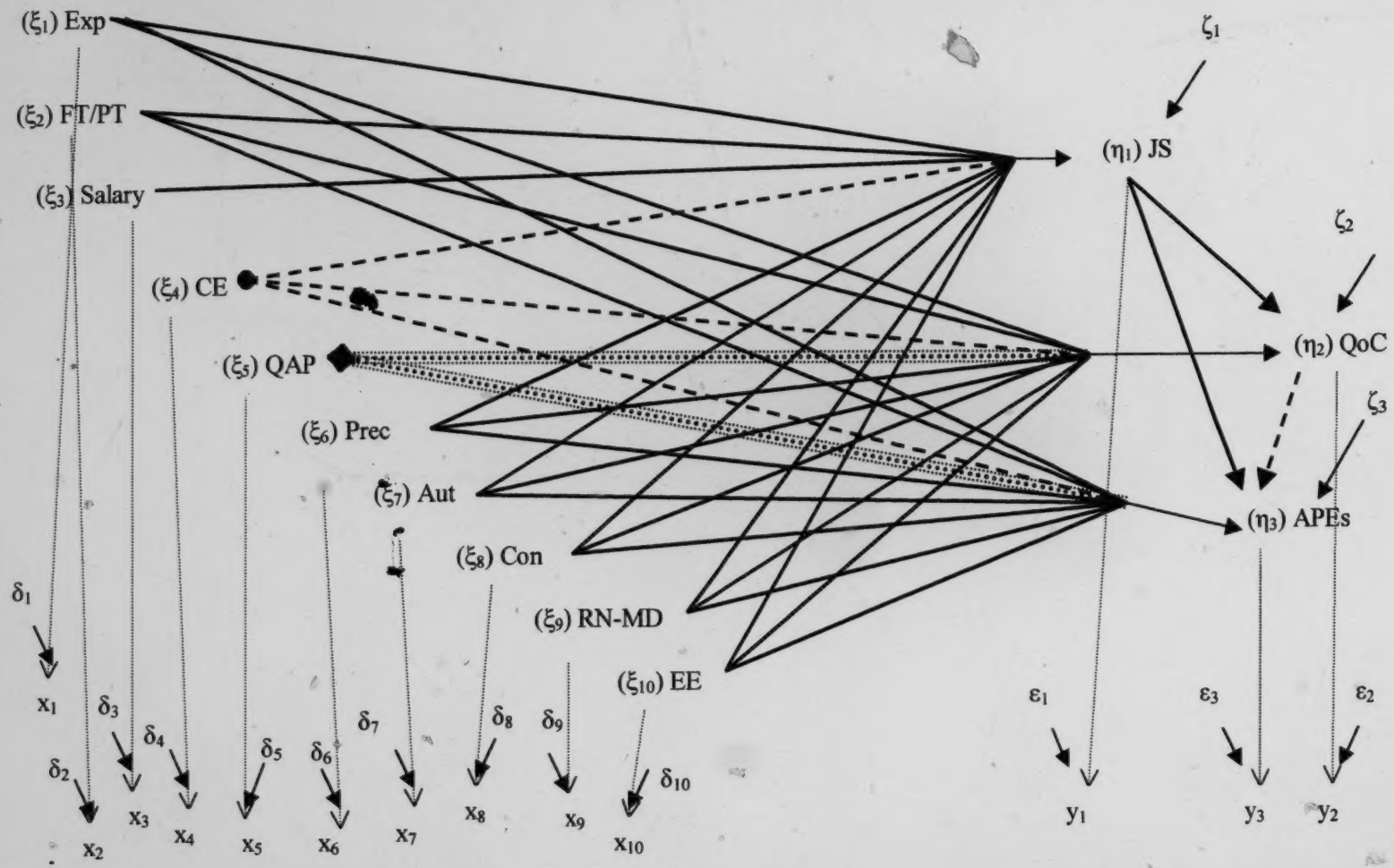
Theoretical Basis of the Stacked Model

"Stacking" models allowed me to run the same model in each specialty simultaneously, while several constraints were hypothesized to be equal across them. I accomplished this by creating a stacked model consisting of four groups: medical, surgical, ICU, and emergency. I call this model Model II or the 4-group stacked model (Figure 6.1). Several constraints were entered into some coefficients, while others were allowed to vary across the groups. I expected to find a variety of different effects on each endogenous variable across the four specialties. This model sought to establish empirically the similarities and differences in nurses' perceptions among those working in the four specialties. The following hypotheses were established for the purpose of constructing the model:

1. Each specialty interacts with "years of experience" to provide differential patterns of effects for each of the four groups. Differential specialty effects might arise because experienced nurses are more likely to work in highly specialized units such as ICU and emergency. Or differences in effects could mean that experience affects another concept (not included in the model) that in turn affects each specialty differently.
2. The percentage of "full-/part-time" nurses is different in each specialty. Thus, I hypothesized that the effects of this variable on "job satisfaction", "quality of care", and "adverse patient events" would be different in the four groups.
3. "Salary" also interacts with specialty, since satisfaction with salary is not the same in each of these four groups. Specifically, the failure of salary to influence job satisfaction in Model I might be specialty dependent. Of the eight salary-satisfaction / specialty combinations, nurses working in emergency should be the least satisfied with their salary for three reasons. First, nurses in emergency have a particularly demanding job, while their salary is no higher than that of other nurses. Second, as Table 6.1 indicates, among nurses in the four specialties, nurses in emergency are the least satisfied (with their salaries). Third, nurses in emergency are usually more experienced than nurses in the other four specialties; therefore, their knowledge and self-esteem are higher than those of their counterparts in the other specialties.
4. Even though "continuing education", "quality assurance", and "preceptorship" programs should be the same in all specialties (all are hospital-based programs), each specialty has its own in-service programs.

Figure 6.1 - The Measurement of Four-Group Stacked Model II* (all exogenous variables covary)

*(**broken line**: equal effects in med & surg; **ordinary lines**: different effects across groups; **dashed lines**: equal effects in med & icu but not in surg or er)



In particular, nurses working in ICU and emergency have more continuing education and preceptorship programs than do their counterparts in other specialties, due to the special needs and severe iilness of their patients. However, as we can see from a comparison of the means of the four groups in Table 6.1, medical and ICU have similar means for "quality assurance program". Further, the means for "preceptorship" are dissimilar across the four groups. Hence, I kept the effects of "continuing education" on all the endogenous variables (i.e., job satisfaction, quality of care, adverse patient events) the same in the medical and surgical specialties, but not in the other two groups (ICU and emergency). Similarly, I kept the effects of "quality assurance" on all the endogenous variables equal in medical and ICU, but not in surgical and emergency, while I hypothesized that the effects of "preceptorship" on the endogenous variables would be different in the four groups.

5. Levels of "autonomy" and "control over nursing practice" are not the same in all specialties. Specifically, I expected ICU and emergency nurses to be more autonomous and have more control over their practice than do medical and surgical nurses. This hypothesis rests on the evidence in the literature.[2,7,8] Therefore, I hypothesized that the effects of "autonomy" and "control over nursing practice" on all endogenous variables would be different across the four groups.
6. I expected "relationships between nurses and physicians" to be better in the ICU and emergency specialties than in the medical or surgical specialties. The main reason for this is that the former specialties constitute highly specialized units where teamwork is of vital importance for better patient outcomes. Also, nurses consider themselves to be (and are) specialized professionals who work closely with physicians. Hence, the effects of this variable on all the endogenous variables would be different for each specialty.
7. "Emotional exhaustion" is a factor that has been extensively studied. Researchers have found that emotional exhaustion levels are not the same in all nurse specialties. Specifically, nurses in medical and surgical units have higher emotional exhaustion levels than do their counterparts employed in ICU and emergency units. Thus, I hypothesized that the effects of emotional exhaustion on all three endogenous variables would be different in the four groups.

In summary, based on these hypotheses, I stacked the medical, surgical, ICU, and emergency (ER) groups together in a single LISREL run, entering the desired constraints among the groups, while other coefficients were allowed to vary across them. Then, I estimated the four specialties simultaneously. This stacked model is a competing model that ultimately clarified several questionable effects in Model I. Figure 6.1 depicts Model II.

Univariate Description of the Indicators in the Stacked Model

I first split the overall sample into four groups: a group of respondents employed in the medical specialty (n=564), another in surgical (n=608), a third in the intensive care unit (n=467), and a fourth in the emergency specialty (n=298). The means and variances of all indicators included in each of the four groups in the stacked model are presented in Table 6.1.

Table 6.1 - Four-Group Stacked Model II: Means and Variances

Indicators	Mean				Variance			
	Medical	**Surgical**	**ICU**	**ER**	**Medical**	**Surgical**	**ICU**	**ER**
JS (y_1)	2.791	2.837	2.974	2.701	0.648	0.614	0.725	0.859
QOC (y_2)	3.195	3.210	3.444	3.014	0.391	0.363	0.364	0.545
APEs (y_3)	2.489	2.213	1.976	1.879	0.616	0.930	0.737	1.358
Exp (x_1)	5.929	6.516	6.687	7.896	23.950	29.757	28.978	36.188
FT/PT (x_2)	1.647	1.641	1.485	1.619	0.228	0.232	0.250	0.237
Salary (x_3)	2.759	2.689	2.726	2.510	0.708	0.746	0.654	0.812
CE (x_4)	2.311	2.366	2.223	2.424	0.812	0.758	0.831	0.877
QAP (x_5)	2.527	2.566	2.538	2.497	0.599	0.548	0.582	0.638
Prec (x_6)	2.561	2.610	2.972	2.731	0.938	0.974	0.782	0.937
Aut (x_7)	7.811	7.790	8.044	7.532	2.984	2.833	2.482	2.859
Con (x_8)	12.402	12.514	13.390	11.495	7.165	7.593	8.188	7.144
RN-MD (x_9)	5.486	5.355	5.981	6.181	1.579	1.597	1.688	1.843
EE (x_{10})	23.757	22.513	19.659	25.714	117.825	119.250	97.200	127.405

These indicators (three endogenous and ten exogenous) are the same as in the original model, but the dummy variables referring to the four specialties (dmed, dsrg, dicu, and der) were excluded. To distinguish the outputs between the four groups, I added an "m", "s", "i", or 'e" to the end of the original indicator name for the medical, surgical, ICU, and emergency groups respectively. For instance, "satisjom" and "satisjoi" indicate "job satisfaction" in the medical and ICU groups respectively, instead of "satisjob" in Model I.

Comparing the means and variances for each group (Table 6.1), the means for "job satisfaction" (JS), "quality of care" (QoC), "adverse patient events" (APEs), "experience" (Exp), "salary", "preceptorship" (Prec), "autonomy" (Aut), "control" (Con), "relations between nurses and physicians" (RN-MD), and "emotional exhaustion" (EE) were dissimilar among the four groups. On the other hand, the means for "full-/part-time" (FT/PT) and "continuing education" (CE) were similar in medical and surgical, but not in the ICU and emergency groups. Similarly, the means for "quality assurance programs" (QAP) were similar in medical and ICU, but not in the surgical and emergency groups. Nurses in ICU were more likely to work full-time, have less continuing education but more preceptorship programs for newly hired nurses, be more satisfied with their job, and provide better quality of care than their counterparts in the medical, surgical or emergency specialties. Also, nurses in ICU experienced more professional autonomy and control over their practice and had higher levels of emotional exhaustion. Nurses in emergency were more likely to have more years of experience and to have good relations with physicians, were less likely to have a quality assurance program, and experienced fewer adverse patient events than in the other three specialties. Nurses in the medical specialty were less experienced and more satisfied with their salary than were those in the surgical, ICU or emergency groups.

The Covariance Matrix

For each group, I created a covariance matrix containing all the indicators from the original model except the dummy variables. Each of the four covariance matrices for the stacked model were obtained using pairwise deletion of the missing values (SPSS 10.0). This resulted in effective sample sizes for the four groups (medical, surgical, icu, and emergency) of 544, 588, 456, and 290 cases respectively; these were used to run the LISREL program. The correlation and covariance matrices, and the indicator measurements, for each of the four groups, are depicted in Table 6.2 and Table 6.3 respectively.

Model Estimation, Fit, and Modifications

Again, as in Model I, the maximum likelihood estimation (MLE) method was chosen to obtain the parameters for the stacked model. The model fit was assessed based on the chi-square (χ^2), the goodness of fit index (GFI), the size of the standardized residuals, and other parameters such as the Q-plot, which is not a diagnostic tool but rather visualizes the contribution of the standardized residuals. I ran three different models: an unconstrained model, the original model, and the final Model II, to which the findings refer. The sets of syntax used to run the unconstrained (Syntax 6.1), original (Syntax 6.2), and final model (Syntax 6.3) are illustrated in Appendix C.

Table 6.2 - Four-group Stacked Model II: Correlations*, Variances**, and Covariances*** Matrices (pairwise)

Medical (N=544)	JS	QOC	APES	Exp	FT/PT	Salary	CE	QAP	Prec	Autonomy	Control	Relation	EE
JS	0.686	0.251	-0.030	0.000	0.052	0.233	0.279	0.225	0.190	0.358	0.411	0.251	-0.599
QOC	0.134	0.416	-0.101	0.054	0.055	0.035	0.147	0.218	0.136	0.289	0.393	0.248	-0.263
APES	-0.020	-0.052	0.657	-0.079	-0.034	0.055	-0.076	-0.029	-0.011	-0.125	-0.061	-0.136	0.152
Exp	0.001	0.175	-0.322	24.929	-0.033	-0.016	-0.062	0.046	-0.003	-0.099	-0.004	0.008	0.028
FT/PT	0.021	0.017	-0.013	-0.077	0.229	0.083	0.135	0.099	0.082	0.094	0.113	0.074	-0.191
Salary	0.163	0.019	0.038	-0.067	0.034	0.722	0.229	0.110	0.055	0.240	0.260	0.134	-0.236
CE	0.210	0.086	-0.056	-0.282	0.059	0.177	0.826	0.307	0.178	0.373	0.365	0.200	-0.280
QAP	0.143	0.109	-0.018	0.178	0.037	0.073	0.218	0.609	0.206	0.364	0.320	0.223	-0.221
Prec	0.154	0.086	-0.009	-0.015	0.038	0.045	0.158	0.157	0.956	0.189	0.167	0.133	-0.177
Autonomy	0.511	0.321	-0.171	-0.849	0.077	0.351	0.587	0.491	0.320	2.982	0.573	0.413	-0.446
CONTROL	0.931	0.696	-0.135	-0.060	0.146	0.606	0.897	0.678	0.446	2.718	7.476	0.345	-0.490
RELATION	0.259	0.201	-0.137	0.050	0.044	0.143	0.226	0.216	0.164	0.897	1.184	1.564	-0.239
EE	-5.403	-1.824	1.320	1.500	-1.002	-2.184	-2.767	-1.873	-1.874	-8.383	-14.612	-3.293	119.214

Surgical (N=588)	JS	QOC	APES	Exp	FT/PT	Salary	CE	QAP	Prec	Autonomy	Control	Relation	EE
JS	0.632	0.358	-0.106	0.059	0.017	0.219	0.190	0.217	0.164	0.373	0.475	0.246	-0.583
QOC	0.174	0.372	-0.163	0.047	0.060	0.107	0.102	0.200	0.129	0.289	0.401	0.221	-0.283
APES	-0.083	-0.097	0.975	-0.013	-0.099	0.017	-0.005	-0.132	-0.032	-0.060	-0.068	0.022	0.086
Exp	0.260	0.157	-0.070	30.352	-0.007	-0.005	0.031	0.048	0.110	0.013	0.009	0.063	-0.048
FT/PT	0.006	0.018	-0.047	-0.018	0.230	0.068	0.033	0.015	0.020	-0.012	0.059	-0.020	-0.171
Salary	0.152	0.057	0.014	-0.024	0.028	0.763	0.218	0.152	0.075	0.296	0.308	0.250	-0.265
CE	0.132	0.055	-0.004	0.149	0.014	0.168	0.778	0.266	0.283	0.339	0.276	0.165	-0.209
QAP	0.129	0.092	-0.098	0.199	0.005	0.100	0.177	0.573	0.232	0.336	0.367	0.232	-0.210
Prec	0.128	0.077	-0.031	0.595	0.010	0.065	0.245	0.172	0.966	0.233	0.262	0.206	-0.175
Autonomy	0.503	0.301	-0.100	0.117	-0.010	0.441	0.510	0.433	0.390	2.883	0.555	0.442	-0.355
CONTROL	1.030	0.664	-0.183	0.139	0.077	0.734	0.661	0.757	0.704	2.557	7.450	0.370	-0.452
RELATION	0.249	0.172	0.028	0.441	-0.012	0.279	0.186	0.224	0.258	0.963	1.277	1.625	-0.181
EE	-5.144	-1.902	0.941	-2.911	-0.908	-2.570	-2.023	-1.740	-1.899	-6.623	-13.617	-2.550	122.981

*Correlations: above the diagonal; **Variances: the diagonal; and ***Covariances: below the diagonal cont'd

cont'd

ICU (N=456)	JS	QOC	APES	Exp	FT/PT	Salary	CE	QAP	Prec	Autonomy	Control	Relation	EE
JS	0.715	0.388	-0.046	0.008	-0.122	0.161	0.196	0.173	0.141	0.335	0.379	0.355	-0.451
QOC	0.201	0.378	-0.174	0.009	-0.061	0.113	0.208	0.211	0.126	0.304	0.419	0.250	-0.308
APES	-0.033	-0.092	0.741	0.027	-0.043	-0.051	-0.107	0.004	-0.171	-0.173	-0.107	-0.126	0.110
Exp	0.035	0.029	0.121	29.099	0.216	0.014	-0.065	0.067	0.001	0.082	-0.072	-0.020	-0.100
FT/PT	-0.051	-0.019	-0.019	0.587	0.250	0.137	0.109	0.091	-0.029	-0.030	0.011	-0.042	-0.154
Salary	0.109	0.055	-0.035	0.060	0.055	0.641	0.107	0.063	0.093	0.228	0.277	0.153	-0.262
CE	0.152	0.117	-0.084	-0.321	0.050	0.078	0.839	0.316	0.194	0.351	0.401	0.193	-0.152
QAP	0.114	0.100	0.003	0.282	0.036	0.039	0.224	0.603	0.203	0.298	0.244	0.135	-0.123
Prec	0.106	0.069	-0.131	0.006	-0.013	0.066	0.158	0.140	0.789	0.244	0.229	0.220	-0.095
AUTONOMY	0.450	0.296	-0.232	0.692	-0.024	0.289	0.510	0.367	0.345	2.509	0.521	0.529	-0.340
CONTROL	0.911	0.733	-0.262	-1.118	0.015	0.636	1.053	0.544	0.585	2.359	8.212	0.369	-0.384
RELATION	0.392	0.200	-0.140	-0.143	-0.027	0.160	0.230	0.138	0.255	1.090	1.383	1.696	-0.241
EE	-3.853	-1.884	0.938	-5.444	-0.758	-2.127	-1.399	-0.954	-0.852	-5.445	-10.968	-3.139	100.803

ER (N=290)	JS	QOC	APES	Exp	FT/PT	Salary	CE	QAP	Prec	Autonomy	Control	Relation	EE
JS	0.857	0.408	-0.139	-0.107	0.039	0.121	0.363	0.278	0.159	0.391	0.456	0.315	-0.623
QOC	0.276	0.537	-0.230	-0.039	0.001	0.076	0.292	0.309	0.091	0.362	0.509	0.342	-0.320
APES	-0.147	-0.195	1.328	-0.146	-0.169	0.054	-0.040	-0.174	-0.014	-0.035	-0.090	-0.007	0.148
Exp	-0.624	-0.183	-1.032	39.582	0.071	0.064	-0.003	0.032	0.043	-0.083	-0.116	-0.185	-0.057
FT/PT	0.017	0.000	-0.095	0.218	0.237	0.086	0.100	0.100	-0.019	0.082	0.072	-0.124	-0.148
Salary	0.102	0.051	0.057	0.366	0.038	0.837	0.156	0.086	0.041	0.225	0.164	0.172	-0.196
CE	0.317	0.201	-0.044	-0.015	0.046	0.135	0.887	0.440	0.256	0.450	0.444	0.263	-0.346
QAP	0.207	0.183	-0.162	0.158	0.039	0.063	0.333	0.647	0.221	0.407	0.439	0.182	-0.258
Prec	0.141	0.064	-0.015	0.262	-0.009	0.036	0.232	0.169	0.920	0.366	0.289	0.149	-0.156
AUTONOMY	0.627	0.460	-0.068	-0.886	0.069	0.356	0.735	0.567	0.608	3.005	0.567	0.437	-0.338
CONTROL	1.123	0.995	-0.274	-1.924	0.094	0.398	1.117	0.951	0.739	2.631	7.114	0.329	-0.424
RELATION	0.401	0.344	-0.011	-1.604	-0.083	0.217	0.342	0.200	0.196	1.041	1.215	1.893	-0.184
EE	-6.581	-2.659	1.912	-4.048	-0.816	-2.013	-3.686	-2.357	-1.705	-6.538	-12.871	-2.876	127.829

Table 6.3. Indicators' Measurement (pairwise)

Concepts	Indicators		Assessed proportion of error variance	Medical		Surgical		ICU		Emergency	
				Variance	Values	Variance	Values	Variance	Values	Variance	Values
Eta (η1)	JS	Y1	0.05	0.686	0.034	0.632	0.032	0.715	0.036	0.857	0.043
Eta (η2)	QOC	Y2	0.1	0.416	0.042	0.372	0.037	0.378	0.038	0.537	0.054
Eta (η3)	APEs	Y3	0.2	0.657	0.131	0.975	0.195	0.741	0.148	1.328	0.266
Ksi (ξ1)	Experience	X1	0.01	24.929	0.249	30.352	0.304	29.099	0.291	39.582	0.396
Ksi (ξ2)	FT/PT	X2	0.01	0.229	0.002	0.230	0.002	0.250	0.003	0.237	0.002
Ksi (ξ3)	Salary	X3	0.05	0.722	0.036	0.763	0.038	0.641	0.032	0.837	0.042
Ksi (ξ4)	CE	X4	0.05	0.826	0.041	0.778	0.039	0.839	0.042	0.887	0.044
Ksi (ξ5)	QAP	X5	0.05	0.609	0.030	0.573	0.029	0.603	0.030	0.647	0.032
Ksi (ξ6)	Preceptor	X6	0.05	0.956	0.048	0.966	0.048	0.789	0.039	0.920	0.046
Ksi (ξ7)	Autonomy	X7	0.1	2.982	0.298	2.883	0.288	2.509	0.251	3.005	0.300
Ksi (ξ8)	Control	X8	0.1	7.476	0.748	7.450	0.745	8.212	0.821	7.114	0.711
Ksi (ξ9)	Relation	X9	0.1	1.564	0.156	1.625	0.163	1.696	0.170	1.893	0.189
Ksi (ξ10)	EE	x10	0.05	119.214	5.961	122.981	6.149	100.803	5.040	127.829	6.391

Unconstrained Model

In the unconstrained model, none of the effect coefficients was constrained to be equal to any of the others in the four groups. The unconstrained model is as if I had run the model in each group separately. However, by running the model once without any constraints, I obtained more information than I could have from running it in each group separately. This information, referring to the fit of the model, indicated that the unconstrained model did not fit the data, which exhibited a significant chi-square value ($\chi^2 = 22.005$, $p=0.0375$) with 12 degrees of freedom.

Original Model

In the original model, I determined which of the Beta (B) and Gamma (Γ) coefficients were to be constrained to be equal among groups and which were allowed to be free to differ between the groups (Figure 6.1). Specifically, the medical and surgical groups were allowed to have equal estimates for the effects of "continuing education" on "job satisfaction", "quality of care", and "adverse patient events" (γ_{14}, γ_{24}, γ_{34}), and for the effect of "quality of care" on "adverse patient events" (β_{32}). Also, the effects of "quality assurance program" on "quality of care" and "adverse patient events" (γ_{25}, γ_{35}) were allowed to have equal estimates in medical and ICU. These effects should not differ in the above specialty groups for various reasons. First, even though "continuing education" is a hospital-based program, it is not the same in the medical and surgical specialties as it is in the ICU and emergency groups. Second, "quality of care" does not have a different effect on adverse patient events in the medical and surgical specialties because these two groups are similar in their organization of nursing practice. Similarly, a "quality assurance program" is a hospital-based program, which should not vary among specialties. Emergency, however, is a different specialty than the other three in many respects (e.g., not the same patients every day, usually patients with increased needs). Emergency is also a more dynamic specialty than the others. Hence, for this reason, and due to the differences in the means and variances across the four groups, the effects of "quality assurance program" on "quality of care" and "adverse patient events" (γ_{25}, γ_{35}) were allowed to have equal estimates in the medical and ICU specialties. The rationale for this decision was that even though "quality assurance program" is a hospital-based program, its means vary among the four specialties. The remaining 24 coefficients for beta and gamma (γ_{11}, γ_{21}, γ_{31}, γ_{12}, γ_{22}, γ_{32}, γ_{13}, γ_{16}, γ_{26}, γ_{36}, γ_{17}, γ_{27}, γ_{37}, γ_{18}, γ_{28}, γ_{38}, γ_{19}, γ_{29}, γ_{39}, γ_{110}, γ_{210}, γ_{310}, β_{21}, and β_{31}) were allowed to be free to differ across the four groups, on the basis of their differing means and variances.

The model converged after 41 iterations. The four-group stacked model resulted in a statistically non-significant chi-square ($\chi^2=29.264$, $p=0.0453$) with 18 degrees of freedom (df), suggesting a good model fit with the data. The Goodness of Fit Index (GFI) for each of the four groups (medical, surgical, ICU, and emergency) was 0.996, 0.998, 0.999, and 0.998 respectively. This model has an improved fit compared to the unconstrained model, even though there are several constraints. Next, I examined the output for each group to identify sources of possible modification that might further improve the fit of the model, and specifically the standardized residuals. In the *medical* group, several standardized residuals exceeded an absolute value of 2.0. These residuals appeared to form a pattern in relation to "salary". The largest standardized residual was 3.119 in the covariance

between "salary" (salarym) and "relation" (relationm), while the smallest (-2.380) was between "salary" (salarym) and "quality of care (qocm). This suggests that random error alone cannot account for the differences between the observed and implied covariance matrices for "salary" (salarym) and "relation" (relationm), and "salary" (salarym) and "quality of care" (qocm).[120] Further examination of the modification indices suggested that freeing the structural coefficient between "salary" and "quality of care" would decrease the chi-square by 5.802. The normal quantile plot (i.e., Q-plot) showed that the standardized residuals lie in a diagonal line, which means it can be a good model after modifications.

In the *surgical* group, one standardized residual exceeded an absolute value of 2.0, which was -2.047 in the covariance between "salary" (salarys) and "job satisfaction" (satisjos). This suggests that random error alone cannot account for the differences between the observed and implied covariance matrices for "salary" (salarys) and "job satisfaction" (satisjos).[120] Further examination of the modification indices suggested that freeing the structural coefficient between "salary" and "quality of care" would decrease the chi-square by 2.096. The normal quantile plot (i.e., Q-plot) showed that the standardized residuals lie in a diagonal line, which means it can be a good model after modifications.

In the *ICU* group, none of the standardized residuals exceeded an absolute value of 2.0. Further examination of the modification indices suggested that freeing the structural coefficient between "quality assurance program" (qualityi) and "job satisfaction" (satisjoi) would decrease the chi-square by 2.916. The normal quantile plot (i.e., Q-plot) showed that the standardized residuals lie in a diagonal line, which means it can be a good model after modifications. No other diagnostics suggested the need for further changes.

In the *emergency* group, none of the standardized residuals exceeded an absolute value of 2.0. Examination of the modification indices suggested that freeing the structural coefficient between "salary" (salarye) and "adverse patient events" (apese) would decrease the chi-square by 2.156. The normal quantile plot (i.e., Q-plot) showed that the standardized residuals lie in a diagonal line, which means it can be a good model after modifications. No other diagnostics suggested the need for changes.

Final Model

In the final Model II, the structural coefficient was freed between "salary" (salarym) and "quality of care" (qocm) in the medical group only, while I kept the constraints from the original model. The model converged after 50 iterations, resulting in a statistically non-significant chi-square (χ^2=24.183, p=0.115) with 17 degrees of freedom (df), suggesting a marginal fit between the data and the model. The Goodness of Fit Index (GFI) in each of the four groups (medical, surgical, ICU, and emergency) was 0.997, 0.998, 0.999, and 0.998 respectively. Since the model fit the data and the examination of the standardized residuals and modification indices in each group did not indicate extreme changes after any alteration/adjustment, I decided not to make any further modifications.

Un-standardized and Standardized Structural Effects

For the four-group stacked model (Model II), Table 6.4 presents all the findings for each group (medical, surgical, ICU, and emergency). These findings include the un-standardized and standardized beta and gamma coefficients, and the squared multiple correlations for the structure equations (R^2) for each of the three endogenous variables (i.e., job satisfaction, quality of care, and adverse patient events). Several indirect effects of Ksi on Eta and Eta on Eta were statistically significant in all four groups.

The signs corresponding to most of the effects for all the groups (final model) were in the direction expected, based on the literature. However, in the medical group, the sign of the effect of "job satisfaction" on "adverse patient events" (β_{31}) was the opposite of what I expected: job satisfaction was associated with more adverse patient events. Also, in the medical group, the effect of "salary" on "quality of care" (γ_{23}) was the opposite of what I was expecting. Satisfaction with salary was associated with deteriorated quality of care. Further, in the medical and ICU specialties, the effect of "quality assurance program" on "adverse patient events" (γ_{35}) was the opposite of what I was expecting. Quality assurance program was associated with more adverse events in these two specialties. Finally, in the surgical and emergency groups, the sign of the effect of "full-/part-time" on "adverse patient events" (γ_{32}) was the opposite of what I expected: part-time employment was associated with fewer adverse patient events.

In the *medical* group, "full-/part-time" was positively associated with "job satisfaction", while "emotional exhaustion" was negatively associated with "job satisfaction". Further, "quality assurance program", "control over practice", and "relationships between nurses and physicians" positively, while "salary" negatively influenced "quality of care". Finally, "quality of care" and "relationships between nurses and physicians" negatively influenced, while "emotional exhaustion" positively influenced, "adverse patient events". In the *surgical* group, "part-time employment", and "emotional exhaustion" negatively influenced, while "control over practice" positively influenced, "job satisfaction". In addition, "job satisfaction and "control over practice" positively affected "quality of care". Finally, "quality of care", "full-/part-time", and "quality assurance program" negatively affected "adverse patient events". In the *ICU* group, "full-/part-time" and "emotional exhaustion" negatively affected, while "control over practice" and "relationships between nurses and physicians" positively affected, "job satisfaction". Additionally, "job satisfaction", "quality assurance program" and "control over practice" positively influenced "quality of care". Finally, "quality of care" and "preceptorship" negatively affected "adverse patient events". In the *emergency* group, "relationships between nurses and physicians" positively influenced, whereas "experience" and "emotional exhaustion" negatively influenced, "job satisfaction". Also, "job satisfaction", "control over practice", and "relationships between nurses and physicians" positively affected "quality of care". Finally, "quality of care", "experience", "full-/part-time", and "quality assurance program" negatively influenced "adverse patient events".

Table 6.4. – Un-standardized and Standardized Beta & Gamma Matrices (Four-Group Stacked Model II)

Groups		Un-Standardized Beta			Un-Standardized Gamma										R^2
		JS	QOC	APEs	Exp	FT/PT	Salary	CE	QAP	Prec	Aut	Con	RN-MD	EE	(%)
JS	Med	–	–	–	0.003	-0.143*	0.068	0.032	–	0.060	-0.002	0.031	0.049	-0.041**	43.6
	Srg	–	–	–	0.004	-0.133*	-0.011	0.032	–	-0.013	0.020	0.069**	0.034	-0.035**	45.1
	ICU	–	–	–	0.005	-0.321**	0.008	0.064	–	0.009	-0.015	0.044*	0.143**	-0.032**	35.7
	ER	–	–	–	-0.013*	-0.080	-0.050	0.072	–	-0.023	0.038	0.043	0.083*	-0.046**	52.4
QOC	Med	0.058	–	–	0.006	0.005	-0.080*	-0.034	0.066*	0.027	0.005	0.084**	0.054*	-0.001	23.6
	Surg	0.156**	–	–	0.003	0.056	–	-0.034	0.031	0.001	0.016	0.063**	0.024	0.000	24.0
	ICU	0.151**	–	–	0.004	-0.085	–	0.009	0.066*	-0.007	-0.001	0.065**	0.016	-0.005	29.2
	ER	0.141*	–	–	0.008	-0.042	–	-0.007	0.068	-0.081	-0.005	0.119**	0.095*	0.000	39.5
APEs	Med	0.131*	-0.167**	–	-0.015*	0.001	–	-0.010	0.082*	0.016	-0.058	0.042	-0.071*	0.016**	9.2
	Surg	-0.103	-0.167**	–	-0.001	-0.191*	–	-0.010	-0.167*	0.003	-0.016	0.017	0.076	-0.001	6.0
	ICU	0.094	-0.266**	–	0.009	-0.108	–	-0.040	0.082*	-0.146**	-0.082	0.029	-0.017	0.005	10.8
	ER	-0.103	-0.439**	–	-0.022*	-0.378*	–	0.113	-0.234*	-0.026	0.069	0.037	0.013	0.004	17.4
		Standardized Beta			**Standardized Gamma**										
JS	Med	–	–	–	0.016	-0.085*	0.069	0.035	–	0.070	-0.004	0.101	0.073	-0.536**	As above
	Surg	–	–	–	0.031	-0.082*	-0.012	0.035	–	-0.017	0.042	0.232**	0.052	-0.486**	
	ICU	–	–	–	0.033	-0.193**	0.008	0.069	–	0.009	-0.028	0.146*	0.215**	-0.384**	
	ER	–	–	–	-0.091*	-0.043	-0.050	0.073	–	-0.024	0.070	0.121	0.120*	-0.557**	
QOC	Med	0.077	–	–	0.052	0.004	-0.108*	-0.049	0.082*	0.043	0.013	0.357**	0.106*	-0.023	
	Surg	0.209**	–	–	0.030	0.046	–	-0.050	0.039	0.001	0.043	0.281**	0.050	-0.005	
	ICU	0.214**	–	–	0.033	-0.073	–	0.013	0.086*	-0.010	-0.003	0.303**	0.033	-0.091	
	ER	0.183*	–	–	0.069	-0.029	–	-0.009	0.077	-0.109	-0.012	0.432**	0.179*	0.004	
APEs	Med	0.145*	-0.140**	–	-0.104*	0.001	–	-0.012	0.085*	0.021	-0.130	0.149	-0.115*	0.231**	
	Surg	-0.091	-0.110**	–	-0.005	-0.104*	–	-0.010	-0.140*	0.003	-0.029	0.049	0.105	-0.008	
	ICU	0.101	-0.202**	–	0.065	-0.070	–	-0.046	0.081*	-0.164**	-0.161	0.103	-0.027	0.065	
	ER	-0.090	-0.296**	–	-0.136*	-0.178*	–	0.100	-0.178*	-0.023	0.110	0.091	0.017	0.039	

*Significant effect >2.0 SD
**Significant effect >3.0 SD
JS: job satisfaction
QOC: quality of care
APEs: adverse patient events
Exp: experience
FT/PT: full-/part-time
Salary: satisfactory salary
CE: continuing education
QAP: quality assurance program
Prec: preceptorship
Aut: autonomy
Con: control over practice
RN-MD: nurse-physician relations
EE: emotional exhaustion

Squared Multiple Correlations for Structural Equations (R^2)

In the *medical* group, the squared multiple correlations for the structure equations (R^2) were 0.436 for Eta 1 (job satisfaction), 0.236 for Eta 2 (quality of care), and 0.092 for Eta 3 (adverse patient events). That is, the proportions of explained variance in the corresponding concepts by the predictor variables were 43.6%, 23.6%, and 9.2% respectively. In the *surgical* group, the squared multiple correlations for the structure equations (R^2) were 0.451 for Eta 1 (job satisfaction), 0.240 for Eta 2 (quality of care), and 0.060 for Eta 3 (adverse patient events). That is, the proportions of explained variance in the corresponding concepts by the predictor variables were 45.1%, 24.0%, and 6.0% respectively. In the *ICU* group, the squared multiple correlations for structure equations (R^2) were 0.357 for Eta 1 (job satisfaction), 0.292 for Eta 2 (quality of care), and 0.108 for Eta 3 (adverse patient events). That is, the proportions of explained variance in the corresponding concept by the predictor variables were 35.7%, 29.2%, and 10.8% respectively. In the *emergency* group, the squared multiple correlations for the structure equations (R^2) were 0.524 for Eta 1 (job satisfaction), 0.395 for Eta 2 (quality of care), and 0.174 for Eta 3 (adverse patient events). That is, the proportions of explained variance in the corresponding concepts by the predictor variables were 52.4%, 39.5%, and 17.4% respectively.

In all four groups, the proportions of the explained variance for the adverse patient events (9.2%, 6.0%, 10.8%, and 17.4% respectively) were small, even though the model showed a good fit. The squared multiple correlations for Y-variables for all four groups were approximately 0.950 for "job satisfaction", 0.900 for "quality of care", and 0.800 for "adverse patient events", representing the assessed proportion of error variance for each endogenous variable. These values are reasonable, since I entered a 5% error for "job satisfaction", 10% for "quality of care", and 20% for "adverse patient events".

Listwise Selection – Sensitivity Analysis

Finally, I used listwise deletion of missing values as well, in order to describe any potential similarities and/or differences in the model for the two runs (listwise, pairwise). For each group, I created a covariance matrix containing all the indicators from the original model except the dummy variables. Each of the four covariance matrices for the stacked model were obtained using listwise deletion of the missing values (SPSS 10.0). This resulted in effective sample sizes for the four groups (medical, surgical, icu, and emergency) of 472, 506, 402, and 254 cases respectively; these were used to run the LISREL program. The sets of syntax used to run the unconstrained (Syntax 6.4), original (Syntax 6.5), and final (Syntax 6.6) models with listwise deletion of missing values are illustrated in Appendix C.

The *unconstrained* model fit the data well with a non-significant chi-square value (χ^2 = 11.155, p=0.516) with 12 degrees of freedom and a goodness of fit index (GFI) approaching 1 in all four specialties. The *original* model converged after 15 iterations. The four-group stacked model resulted in a statistically non-significant chi-square (χ^2=18.158, p=0.445) with 18 degrees of freedom (df), suggesting a good model fit with the data. This model was an improvement compared with the unconstrained model, even though several constraints applied. The diagnostics suggested no further changes, but I

freed the effect from "salary" (salarym) to "quality of care" (qocm) anyway in order to obtain an analogous output as in the pairwise deletion (final model). The *final* model converged after 10 iterations, resulting in a statistically non-significant chi-square (χ^2=16.105, p=0.516) with 17 degrees of freedom (df), suggesting a good model fit with the data. The Goodness of Fit Index (GFI) in each of the four groups (medical, surgical, ICU, and emergency) was close to 1.

For the final model, the squared multiple correlations for the structure equations (R^2) in the *medical* group, were 0.453 for Eta 1 (job satisfaction), 0.211 for Eta 2 (quality of care), and 0.088 for Eta 3 (adverse patient events). That is, the proportions of explained variance in the corresponding concept by the predictor variables were 45.3%, 21.1%, and 8.8% respectively. In the *surgical* group, the squared multiple correlations for the structure equations (R^2) were 0.462 for Eta 1 (job satisfaction), 0.266 for Eta 2 (quality of care), and 0.065 for Eta 3 (adverse patient events). That is, the proportions of explained variance in the corresponding concepts by the predictor variables were 46.2%, 26.6%, and 6.5% respectively. In the *ICU* group, the squared multiple correlations for the structure equations (R^2) were 0.330 for Eta 1 (job satisfaction), 0.280 for Eta 2 (quality of care), and 0.108 for Eta 3 (adverse patient events). That is, the proportions of explained variance in the corresponding concepts by the predictor variables were 33.0%, 28.0%, and 10.8% respectively. In the *emergency* group, the squared multiple correlations for the structure equations (R^2) were 0.520 for Eta 1 (job satisfaction), 0.404 for Eta 2 (quality of care), and 0.226 for Eta 3 (adverse patient events). That is, the proportions of explained variance in the corresponding concepts by the predictor variables were 52.0%, 40.4%, and 22.6% respectively.

Finally, I checked several problematic effects (i.e., β_{12}, γ_{32}) to find any differences among them in the pairwise and listwise selections. Then, I looked at both covariance matrices (pairwise and listwise) for covariance values and for the number of missing cases in the listwise selection for each specific effect. A sensitivity analysis was also conducted for the measurement error specifications by first halving and then doubling each fixed error term, one error term at a time. There were no differences in model fit for any of the twenty modifications, and there were no major changes in the effects.

Overall, listwise deletion of missing values provides overestimated effects compared with the effects of the pairwise selection. I would suggest students and novice researchers to select the listwise deletion of missing cases to deal with complete data sets in order to study relationships among variables. Pairwise matrices may cause potential estimation problems.

Summary

In summary, I ran the four-group stacked model six times (three times with pairwise and three times with listwise selection). In the pairwise selection, the model fit the data marginally in the final run (final model), but did not exhibit a good fit in the other runs. With listwise selection, the model fit the data well in all runs (i.e., unconstrained, original, and final model). The final model with pairwise selection explained only a small portion of the variance in adverse patient events. As expected, job satisfaction and quality

of care affected (in a positive and negative way respectively) adverse patient occurrences. Also, the cultural manifestations of formal and informal practices and emotional concerns influenced adverse patient events.

Running the model as a four-group stacked model, I obtained important information about the four nurse specialty subcultures, their similarities and differences, and the differential effects of cultural manifestations on the selected nurse and patient outcomes (i.e., job satisfaction, quality of care, and adverse patient occurrences) across the four groups. Additionally, the model provided data on the size and variability of each cause (e.g., salary) and effect (e.g., job satisfaction) variable. The un-standardized beta and gamma matrices provided information on the size of the effect between the cause and outcome variables. The standardized beta and gamma matrices incorporated both the magnitudes of effects corresponding to the cause and effect variables, and the variability of each of them. Overall, the four-group stacked model yielded important findings, which will be discussed in the next chapter (Chapter 7).

Chapter 7
Discussion

The primary purpose of this study was to expand understanding of hospital culture – and, in particular, nurse specialty subcultures – and identify their impact on adverse patient outcomes. The main findings of this study are twofold. First, there is evidence that nurse specialty subcultures are nested within acute care hospitals. Second, the most important causal mechanisms involved between nurse specialty subcultures and adverse patient outcomes are nurse job satisfaction, quality of care, nurses' emotional exhaustion, and control over nursing practice.

This chapter includes eight main sections. First, before discussing the findings, I would like to present the limitations of this study in order to clarify the level of confidence we can have in generalizing them. Then, I discuss the findings from Models I and II, interpret these findings based on Martin's theoretical framework, and summarize the key conclusions following from Models I and II. Next, I describe the contributions of this study to (nursing) knowledge, outline research implications, and briefly describe the conclusions of the study.

Limitations of the Study

I identified six limitations involved in this study. First, there are theoretical and methodological issues arising from the secondary data analysis. Among the theoretical issues are constraints in choosing research questions, as well as restrictions upon the studied concepts and populations, which should be consistent with the available information in the data. The methodological challenges – which include potentially imprecise indicators of the concepts to be studied, selection biases (inclusion/exclusion criteria), and issues related to the representativeness of the primary study – may be even more important than the theoretical challenges.[140,94,52] As a researcher doing secondary data analyses, I dealt with several issues in this study, mainly with conceptual imprecision and a limited number of indicators for the selected concepts. Conceptual imprecision, in this case, refers to organizational culture and its operational definition. The challenge in regard to indicators refers to the operational definition of adverse patient events, even though Hayduk[120] argued that the use of structural equation modeling attenuates these limitations by assessing the proportion of error variance in each concept.

The second limitation involves a representativeness bias. Even though the response rate (52%) in the Alberta primary study is favorable in comparison with other surveys of health professionals and the sample for this study was derived from the primary data set (n=6,526), the findings of this study do not accurately reflect the nurse population of Alberta. This has to do with two inclusion criteria (Chapter 4). First, only nurses employed in four nurse specialties were sampled, and, second, only hospitals that provided respondents from all these four specialties were included in the sample. The findings of the study apply to nurses employed in one of the four specialties (i.e., medical, surgical, ICU, and emergency) in Alberta acute care hospitals. After all, approximately 46% of nurses working in these specialties during 1998 were included in the primary study and 30% of them in this secondary study. Therefore, the findings of

this study cannot be generalized due to its non-representative sample. My main interest, however, was internal, not external, validity.

The third limitation refers to the measurement of organizational culture using an exclusively quantitative approach. Several researchers have argued that organizational culture is not amenable to quantitative research, because quantitative methods have a tendency to focus on single and discrete elements of culture, ignoring its multidimensional nature.[276,226] However, not all investigators agree with this position. For example, Golden-Biddle and Rao[113] maintained that many quantitative methods studying organizational culture are useful because they offer a panoramic view. Field research (qualitative approaches) into organizational culture is also necessary to provide a complementary view of organizational culture. Miner[200] suggested that, since several projective techniques are used to measure unconscious motivation in micro-organizational behavior, similar techniques can be used to measure cultural assumptions in macro-organizational behavior (e.g., Thematic Apperception Test). He argued that quantitative techniques are available to test hypotheses of culture theories. Just because these techniques are quantitative is not an excuse to leave theories untested, even though these tools need elaboration.[273]

Fourth, the items on the NWI and the MBI have not been previously used to measure cultural manifestations, hence they have not been empirically tested.[216,153,154,151] Even though Gershon et al.[107] argued that what the NWI actually measures is organizational climate, researchers who used it claimed to be measuring organizational characteristics. Fifth, the NWI has not been used to distinguish units smaller than hospitals, so its ability to distinguish these smaller groups (e.g., subcultures) within hospitals has not yet been established.[20,267] Finally, a threat to validity is posed by the self-selection of nurses into hospital units.

Martin's Framework

According to Martin[182], the researcher's choice of a perspective (integration, differentiation, or fragmentation) for studying organizational culture depends on the researcher's interests, but each perspective can be expected to yield different results. From an integration perspective, I would expect the findings and effects to be similar across all four specialties. The conclusion would be that cultural members share a common conception of the meaning of their organizational culture and a common culture exists across all units/subcultures. From a differentiation perspective, Martin's work would predict that effects will vary in nature and size among the four specialties. This finding could lead to the conclusion that several subcultures are nested within an organization. Finally, from a fragmentation perspective, the findings would have no pattern of similarities or differences among the four groups. As a result, there would be no shared meanings among cultural members either at the organizational or at the unit/subculture level. The contradictory findings arising from these three perspectives lead to different implications for implementing research findings. For example, policies could be developed based on manifestations of subculture (differentiation perspective) or on the "shared" meaning of such manifestations at the organizational level (integration perspective). For these reasons, Martin argued that the preferable approach, to obtain

more informative findings, would be to apply all three perspectives to the same population.

I attempted to categorize this study into one of Martin's five categories of differentiation perspective cultural studies (Chapter 2) in order to confirm my claim that it is indeed a cultural study from the differentiation perspective. First, the fact that I investigated a range of four nurse specialty subcultures within the boundaries of a collectivity (hospital) is consistent with the third category (horizontal / functional subcultures) of differentiation perspective studies. Second, studying cultural differences among subcultures (second category) was consistent with the second category of differentiation perspective studies. For these two reasons, this study can be categorized as an investigation of organizational culture from the differentiation perspective.

The Story on Model I

In this study, I attempted to answer two research questions. First, "Do nurse specialty subcultures exist within acute care hospitals in Alberta?" and, second, "How do nurse specialty subcultures influence nurse and patient outcomes?" The *first research question* could be answered in three different ways. First, by comparing the means of each cultural manifestation among subcultures. Second, by examining the magnitude of the effects of each causal variable (cultural manifestation) on outcomes across subcultures (un-standardized beta and gamma matrices). Third, by studying the variances of exogenous (causal) and endogenous (effect or outcome) variables. The *second research question* can be answered by investigating, first, the magnitude of the effects of each outcome (un-standardized beta and gamma matrices). Second, by examining the variance of each outcome, which arises from the variability both of each cause (exogenous) variable and of each outcome (endogenous) variable (standardized beta and gamma matrices). For example, the magnitude of the effect of "emotional exhaustion" on "adverse patient events" may be due to a) a modest variance (variability) in emotional exhaustion, but a strong effect, or b) a huge variance in emotional exhaustion, but a modest effect. In the first case, it is the size effect that explains the variance in the outcome, regardless of the individual nurse's level of emotional exhaustion. This would mean that virtually every nurse had the same level of emotional exhaustion (low variability). In the second case, the huge variability in emotional exhaustion among nurses in a specialty explains the variance of the outcome. However, the variability of emotional exhaustion in this study is not known, because emotional exhaustion as an exogenous variable does not provide information on the factors that affect it.

This section is based on the findings of Model I, as described in Chapter 5. Model I provided information to grossly answer the first research question, but did not provide enough information to clearly answer the second research question. I endeavored to answer the first question by studying the means and variances of all variables, and comparing their differential effects on outcomes across subcultures. Next, I discuss three key conclusions arising from Model I.

First, I considered the sample of Model I as a homogeneous population where the variability of each exogenous variable depends on unknown factors. Similarly, the effects

between exogenous and endogenous variables were considered to be the same (equal) in all four nurse specialty subcultures, even though I could not control them in order to compare their means. The differential effects among the dummy variables are the single most important part of the model. Comparing these three dummy variables with the reference group (medical) *indicates* that nurse specialty subcultures do exist within hospitals, a finding consistent with Martin's framework, since differential effects are based on endogenous variables. For instance, quality of care was better in the ICU specialty than in medical. Also, fewer adverse patient events occurred in the ICU and emergency specialties compared with the medical specialty. However, there are at least four competing explanations for these differences. First, the nurses who responded in each specialty had different responses on several demographic variables, which in itself could generate inconsistent results. Second, these differences may exist due to different variances across specialties. Third, the finding of better quality of care and fewer adverse patient events in the ICU specialty may be due to a better nurse-to-patient ratio, closer monitoring, and a higher degree of nurse specialization. Additionally, there is usually a smaller probability of patient falls or nosocomial infections in the ICU specialty because ICU patients are unconscious and under medication control. Also, a number of antibiotics are provided in ICU in order to avoid acquired infections. Fourth, there were fewer adverse events in emergency for a number of reasons: the administration of medications is limited, patients are given urgent treatment due to severity, and nosocomial infections have no chance of occurring in these units since a nosocomial infection, by definition, needs 72 hours after hospitalization to be classified as nosocomial.[13]

Second, I found several significant, although weak, structural effects in Model I. For example, both the effects of "control over practice" on "quality of care" and "emotional exhaustion" on "job satisfaction" were significant but weak. This can be attributed to the huge variability of the cause variables ("control over practice" and "emotional exhaustion") in all four specialties. However, the effect of "emotional exhaustion" on "job satisfaction" is consistent with several researchers' argument that negative feelings created in the work environment compromise the immune system and are strong predictors of several serious physical and emotional health problems.[68,67,103]

Third, the findings of Model I indicated that the selected informal practices are more important factors for job satisfaction and quality of care than are the formal ones. This conclusion was derived from both the number and size of the effects of formal and informal practices on all three endogenous variables. For instance, the most important (strongest) structural effects for higher levels of job satisfaction were part-time employment (demographics), control over practice, and nurse-physician relationships, whereas emotional exhaustion was a negative influence. For better quality of care, job satisfaction, control over nursing practice, and good nurse-physician relationships were strong structural effects. Further, quality of care was vastly superior in the ICU specialty. For fewer adverse patient events, two structural effects were important: a) better quality of care, and b) working in (or being hospitalized in) the ICU and emergency specialties.

In terms of the structural effects and explanatory power of Model I, I would argue that structural effects explained a remarkable proportion of the variance in job satisfaction and

quality of care. However, only a small proportion of the variance in adverse patient events could be explained in this way. Model I, then, has limited testing power with two degrees of freedom (df = 2), weak construct validity, and little explanatory power for adverse patient events (R^2 = 10.5), which provided little confidence in the findings. This model suggests that there are causal relationships between: (1) cultural manifestations and nurse job satisfaction, quality of care, and adverse patient events; and (2) nurse job satisfaction and quality of care and adverse patient events. These findings are consistent with the existing literature.[7,9]

In summary, Model I provided evidence for the existence of nurse specialty subcultures. However, I was not able to answer the second research question, because the technique of analyzing at the individual level and keeping all respondents together in the same sample (as if they were a homogeneous group) does not make it easy to find interactions among subcultures. A detailed exploration of these nurse specialty subcultures and further analysis (i.e., using the stacked model) revealed more informative findings and improved insights into both the first and second questions.

The Story on Model II

The four-group stacked model II, a competing model, allowed me to run the same theoretical framework (model) in each specialty simultaneously, while several constraints were permitted to be equal across them. The results from Model I indicated that each effect would be expected to interact in several different ways within each specialty. For this reason, the four subcultures were estimated simultaneously, based on both the variability of and the magnitude of effects among the exogenous and endogenous variables. Structural effects across the four nurse specialty subcultures were compared in order to explore potential differences and similarities. To answer the first and second research questions, I examined the magnitude of effects between exogenous (causal, cultural manifestations) and endogenous (outcomes) variables, in addition to studying, across subcultures, the variances of both the exogenous and endogenous variables associated with each structural coefficient. This approach allowed me to control some coefficients before comparing others. There were more similarities than differences among these four nurse specialties. For this reason, I present the findings together and highlight any differential effects.

Experience

"Experience" negatively influenced "job satisfaction" in emergency and "adverse patient events" in the medical and emergency specialties. This finding is consistent with the existing literature.[32]

Full-time/Part-time

In all specialties but emergency, nurses employed part-time were less satisfied with their job than were their counterparts working full-time. Part-time nurses also experienced fewer adverse events in the surgical and emergency groups. The magnitude of effects of "full-/part-time" on both "job satisfaction" and "adverse patient events" were among the strongest factors. Variability of "full-/part-time" was limited in all specialties. I expected that full-time nurses would be more satisfied with their job than were their part-time

counterparts, even though full-time work might interfere more with nurses' personal lives (e.g., family responsibilities). The finding that part-time nurses experienced fewer adverse events could simply mean that they had comparatively limited opportunities to encounter such events. Or, it could follow from the fact that part-time nurses usually take care of the less severely afflicted patients. Finally, another explanation could be that part-time nurses had lower levels of fatigue and emotional exhaustion.

Salary

Satisfaction with salary has not been extensively studied in nursing, but there are a few studies in which salary as a factor in job satisfaction is briefly but positively mentioned.[42,138,147,148,193,295] As a motivator, salary affects job satisfaction, but the degree to which this is the case is debated in the literature.[28,27] Blegen and Mueller[28] found that salary had little effect on job satisfaction, whereas Blegen et al.[27] found contradictory results on this question. Usually, nurses are dissatisfied with their salaries in light of the care they provide.[44] Lynn and Kelly[175] argued that if nurses employed on a unit are dissatisfied with their pay or other rewards, they might be less likely to provide high-quality care and less likely to be retained at the hospital.

Interestingly, in this study, salary did not have a significant effect on job satisfaction, which is consistent with other findings. When Froebe et al. (1983) asked nurses to rank the most important factors for their job satisfaction in hospitals, salary was the third most important factor, while Larson et al. (1984) found salary ranked twelfth and Munro (1982) ranked salary sixth (as cited in Blegen & Mueller[28]). Further, Coile[62] argued that magnet hospitals use cultures of excellence, not good wages, to attract and retain nurses. I did find, however, that salary had a significant but negative effect on quality of care, a puzzling result that I could not readily account for. In the model, the effect was recursive from "salary" to "quality of care", not reciprocal. Therefore, arguments such as "when quality of care is low, then nurses are satisfied with their salary since the outcomes are not what they expected" were not acceptable.

A possible explanation of this finding can be found in Martin's[180] argument that nursing as a service profession is characterized by intangibility, perishability, variability, and inseparability. That is, nursing care is something that cannot be seen before being consumed; nursing care is consumed immediately and cannot be stored; the quality of nursing care depends on *who* provides it and on the quality of the interaction between nurses and patients; and nurses and patients are inextricably inter-linked. Further, based on a body of psychological literature, Martin[180] outlined two reasons against linking pay and performance. First, satisfaction with rewards encourages people to focus on tasks and activities, to do them as quickly as possible, and to take few risks. The emphasis is thus on the reward, not on the quality of activities. Second, extrinsic rewards can erode intrinsic interest. Eventually, employees experience themselves as being controlled by the rewards. In other words, using money as a motivator leads to a progressive deterioration of the quality of the thing being produced.

Quality Assurance Program

The presence of a "quality assurance program" influenced "quality of care", as I expected, in medical and ICU, and significantly reduced "adverse patient events" in the surgical and emergency specialties. The variability of this factor was small.

Preceptorship

The effect of "preceptorship" on "adverse patient events" was significant (negative association) only in ICU, probably because nurses newly hired in ICUs need preceptors due to the severity of their patients' afflictions.

Control Over Nursing Practice

"Control over practice" was a factor influencing job satisfaction in the surgical and ICU specialties, while it was one of the strongest statistically significant factors affecting "quality of care" in all four groups. However, the magnitudes of the effects were weak, and variability, for reasons unknown, was large in all specialties.

On the other hand, professional "autonomy" was not an important factor in any of the four specialties. This phenomenon may be explained by the conceptual confusion between autonomy and control over practice. Kramer and Schmalenberg[155,149] argued that the relationships between control over practice, shared governance, and professional autonomy are unclear. However, all these concepts describe a common and desired characteristic in nursing practice: an increase in nurses' influence within hospitals.[122] "Control over practice" influences nurses' job satisfaction and makes them feel good, which means that increasing control over practice represents a strategy for stimulating nurses' role function in this time of high shortage and low retention.[149] In several studies relevant to the magnet hospital literature, "control over nursing practice" was found to be associated with outcomes in healthcare organizations.[9,43,119,149,152,153,154,162]

Nurse-Physician Relationships

Professional "relationships between nurses and physicians" was another variable affecting job satisfaction in the ICU and emergency groups. It also positively influenced "quality of care" in medical and emergency and negatively influenced "adverse patient events" in the medical specialty. These findings are consistent with several other studies.[3,9,20,47,73,91,138,152,188,193,215] However, the fact that the variable "relationships between nurses and physicians" was not an important factor for nurse job satisfaction in the medical and surgical specialties raises two important questions. Does this mean that nurses in the medical and surgical specialties draw their job satisfaction from other sources? Or, for nurses in the medical and surgical units, are good relationships with physicians relevant only to obtain better patient results? Recently, Kramer and Schmalenberg[156] conducted a quantitative study to clarify the definition of "good" nurse-physician relationships. Their findings were consistent with this study. The researchers found that the quality of nurse-physician relationships was not consistent throughout a hospital but rather varied by specialty. For instance, emergency specialties, relative to medical/surgical units, reported more collegial relationships, while medical/surgical nurses reported more student/teacher, neutral, or negative relationships.

Also, nurses in the medical specialty reported that good relationships with physicians were not associated with their job satisfaction, but with better quality of care and fewer adverse patient events. This finding is consistent with other studies,[156] where the association of nurse-physician relationships with quality of care was positive. For instance, when the quality of relationships between nurse and physician was collegial and collaborative, the quality of care was higher than in specialties where nurses reported teacher/student, neutral, or negative relationships. Why are "good" nurse-physician relationships associated with desired nurse and patient outcomes? What do such relationships indicate? Are they an important factor because they make individuals feel better (more satisfied) or on account of helping communication among professionals? These questions cannot be answered by this study. Further research (probably qualitative) might illuminate these research questions.

Emotional Exhaustion

In all four groups, "emotional exhaustion" negatively affected "job satisfaction", but it positively influenced "adverse patient events" in the medical specialty only. The variability in "emotional exhaustion" was large in all groups. Among the four specialties, nurses in ICU experienced the lowest level of emotional exhaustion. These findings are consistent with several other studies.[272,7,267,284] Frost[103] argued that emotional pain can be used as a diagnostic tool for identifying sources of toxicity. He described the cost of toxicity by comparing the benefits of a compassionate supervisor with those of a satisfactory salary. Employees rated the benefits of a compassionate supervisor higher than those of the money they earn. In a qualitative study exploring nurses' emotionality,[159] nurses' emotions were found to be in tension with one another and with nurses' actual experiences of daily work life. These emotions are complex, varied, blended, and change over time. Van Servellen and Leake[284] found that nurses' emotionality, in combination with several catalysts such as coworker and patient behaviors and with type of unit, job tension, and 8-hour shifts, resulted in the highest levels of emotional exhaustion. Firth and Britton[98] investigated the relationships among burnout, turnover, and absenteeism in British nurses and found that absenteeism was associated with higher levels of emotional exhaustion. As is evident from a growing body of literature, the consequences of emotional exhaustion (and burnout) can have any number of physical, emotional, interpersonal, attitudinal, and behavioral consequences and implications.[66] These implications can affect each individual employee, his/her family and friends, the organization, and clients with whom the employee interacts.[66] In short, emotional exhaustion is an organizational problem that involves a broad range of costs and consequences for both employees and employers.

Further, the fact that "emotional exhaustion" affected "job satisfaction" but not "quality of care" or "adverse patient events", may be suggestive of the level of professionalism among nurses. As professionals, nurses may force themselves to provide a high level of quality of care and avoid adverse events. In addition, "emotional exhaustion" increased "adverse patient events" in the medical specialty. This effect is understandable and can be justified. However, the fact that this effect is significant only in the medical specialty cannot be easily interpreted. It is likely that nurses in medical units are emotionally

exhausted beyond any acceptable limits and this stressful experience may affect the number of adverse patient occurrences.

Comparison of Cultural Manifestations

Looking at the findings from another point of view, I compared cultural manifestations (i.e., formal and informal practices, content themes) and demographics and concluded that the most significant factors explaining outcomes in each specialty were informal practices (e.g., control over practice, nurse-physician relationships) and emotional exhaustion (both ideational cultural manifestations). These cultural manifestations increased job satisfaction, improved quality of care, and reduced adverse patient events.

Comparison Among Specialties

In the medical and emergency specialties, "years of experience" significantly influenced adverse patient events. That is, the more experienced the nurses are in each of these specialties, the fewer the adverse patient events occur in that specialty. On the other hand, in the ICU specialty, years of experience did not significantly influence adverse patient events, probably because they acknowledged "preceptorship" as a significant factor for reducing adverse patient outcomes. Based on these findings, it is likely that hospital administrators could reduce adverse patient events in the medical and emergency units by increasing the number of experienced staff nurses on these units. In ICU specialty, on the other hand, preceptorship significantly influences adverse patient events. That is, the more nurses were involved in preceptorship, the fewer the adverse patient events. Preceptorship is a common practice in ICUs. Keeping an eye on unexperienced nurses is likely a preventive mechanism for adverse incidents to occur.

In the surgical and emergency specialties, "quality of care", "full-/part-time", and "quality assurance program" negatively influenced adverse patient occurrences. In the emergency specialty, also nurses with greater "experience" was another complementary way of reducing adverse patient occurrences. The rationale for this finding is likely that nurses in the surgical and emergency units do not consider themselves as specialized nurses, so they do not require autonomy, control over practice, or good relationships with physicians. In contrast, they may believe that formal practices are adequate and sufficient factors for reducing adverse patient events.

Nurses in the medical, surgical, and ICU specialties reported that part-time employment negatively contributes to their job satisfaction, even though these effects are weak. Nurses in the surgical and emergency specialties also reported that part-timers reduce the number of adverse patient events. This last finding in the surgical and emergency units can be explained by the fact that part-timers have less time and chances to experience or be involved in adverse patient events. Studying the frequencies of nurses working as full-/part-time employees, I found that approximately 58% of nurses worked part-time and 40% full-time. Of these part-time nurses, 22% reported working fewer than 20 hours per week, while 14% worked 20-34 hours per week. Of the full-time nurses, only 16% worked 40 hours per week. These frequencies lend credence to the hypothesis of limited chances for the part-time nurses to experience adverse patient incidents. In addition, the extra time that full-timers worked might bring them to the critical point at which nurse

fatigue levels were sufficient as to cause, or lead nurses to be involved in, significantly more adverse patient events. Thus, I would say that part-time employment mainly contributes to decreasing nurse job satisfaction and secondarily to reducing adverse patient incidents.

Summary of Model I and Model II

From this study in general and the stacked model in particular, three primary conclusions can be drawn. First, there are differential effects and several distinctive characteristics among the four nurse specialty groups. For instance, the proportion of explained variance for job satisfaction by predictor variables ranged from 36% to 52% across specialties, while the corresponding range for adverse patient events was 6% to 17%. A possible explanation for these differences among the four specialty groups is that nurses in these subgroups differ in their assessment of quality of care and in their recall of adverse patient events. These results also indicate that different causal mechanisms may subsist among these specialties and that nurse specialty subcultures are indeed nested within hospitals, despite their various locations (nursing units). These findings are not consistent with Coeling and Simms's[56,57] conclusions. These researchers argued that subcultures do exist within hospitals, but only at the nursing unit level (with geographical boundaries). They also claimed that it is more likely to find similar nursing units between specialties than within them.

Second, in all four specialties, nurses' emotional exhaustion had the strongest causal relationship with outcomes (i.e., job satisfaction, quality of care, adverse patient events) of any variable included in the model. Hence, how practice environments make employees feel is an important factor for outcomes. Martin[182] argued that emotional concerns (e.g., emotional exhaustion) are cultural manifestations (content themes) that capture a deeper level of organizational culture (and subcultures) that is difficult to describe.[228] Thus, in this quantitative cultural study, measuring nurses' emotional exhaustion is an important approach to understanding organizational culture and nested nurse specialty subcultures at a deeper level. In addition, the strongest magnitudes of effects among cultural manifestations, demographics, and endogenous variables were full-/part-time employment, quality assurance program, job satisfaction, and quality of care.

Third, the stacked model confirms the insight that informal practices (i.e., autonomy, control over practice, good relationships RN-MD) are stronger causal predictors of job satisfaction, quality of care, and adverse patient occurrences than are formal ones. Informal practices are those procedures within organizational life that need no extra money and reduce stress.[103] However, as Hayduk[120] argued, results are not the coefficient estimates themselves, but the substantive implications (predictions) of the estimates obtained through a combination of the best available theory and data.

Contribution to Knowledge

This study of nurse specialty subcultures and their impact on adverse patient events contributes to the literature on organizational culture in the healthcare sector in three major ways. First, it illustrates evidence of the existence of nurse specialty subcultures

nested within hospitals. The emerging nurse specialty subcultures not only affect nurse professionalization but also influence patient and nurse outcomes. There are few studies from the differentiation perspective in the healthcare sector and fewer still in the nursing literature. However, the variety of professionals who work there, nursing units and/or specialties, the patients who spend a significant period of time on the unit, the technology involved in the work, and the physical layout of the workplace all contribute to organizational subcultures. This study provides a number of critical insights. First and foremost, hospital cultures are made up of several professional subcultures, since the health sector is highly professionalized. Moreover, hospitals are dynamic environments where non-routine activities, sophisticated technologies, and various leadership styles all coexist.[211] Deal and Kennedy[74] described the barriers that prevent hospitals from developing and maintaining a strong organizational culture. These barriers include: serving diverse patients needs; difficulty in defining and measuring outcomes; coexistence of various personal and organizational interests; culturally inactive board members; a powerful physicians' subculture; nursing's lack of professional identity; and administrator pressure to facilitate both delivery of care and cost-effective 'business'. Further, culture, by definition, is the property (personality) of a group of individuals with stable membership, low rates of member turnover, and shared assumptions.[228] Small groups (subcultures) are more likely than the entire organization to share these characteristics. In a small group of individuals it is easier to adopt innovations and change procedures than in the entire organization. After all, a small group of individuals has the opportunity to discuss the pros and cons of an innovation and ultimately be convinced of its merit. Moreover, each group has its own rationale, norms, behaviors, and actions (i.e., subculture). It is critical that we understand the differences among subcultures so that they are better able to communicate with one another and respond to differences.

Second, it introduces a new perspective in using elements of two old instruments (i.e., NWI & MBI) to measure several cultural manifestations. There is empirical evidence that nurse professional autonomy and control over practice are essential elements for better nurse and patient outcomes. Additionally, empirical evidence indicates that good relationships between nurses and physicians mean trust, open communication, collaboration, respect, recognition, and a sense of camaraderie that can help make it possible to meet priorities. When these key elements are missing, patient and provider satisfaction decreases, and both turnover and costs increase. More important, research findings suggest that collaboration and teamwork lead to quality patient outcomes.[85] However, these characteristics (i.e., nurse professional autonomy, control over practice setting, and relations between nurses and physicians) in hospital practice environments have never been empirically tested before,[110] especially as cultural manifestations. Further, structural characteristics are not as directly related to patient outcomes and quality of care as are processes.[169] Therefore, studying processes in a working environment (i.e., professional autonomy, control over practice, and relationships between nurses and physicians) may make it possible to account for the variance in provider and patient outcomes. Gershon et al.[107] argued that the NWI-R measures organizational climate. It is evident that the concepts of organizational climate and culture still tantalize researchers.

Third, it identifies potential causal mechanisms between nurse specialty subcultures and adverse patient occurrences, which is an important approach for two reasons. In regard to the first reason, this study makes it possible to understand adverse patient events in greater depth and to identify the potential causes of these events. In regard to the second reason, using this approach, nurse specialty subcultures can be tested and compared based on adverse patient outcomes, which may assist in finding, describing, and maintaining desired subcultures to improve quality of care. Further, by identifying potential causes and effects between subcultural elements and outcomes, it may be possible to develop a suitable theory. Given that organizations are continually evolving,[176] there is really no universal theory or paradigm (valid in all contexts) for examining organizational culture, but theories can at least shed light on the complex concept of organizational culture.

Van Maanen and Barley[283] argued that there are four distinct advantages to the differentiation perspective on organizational culture. First, it preserves some of the existential everyday reality of work experience. Second, it broadens our understanding of social control in organizations. Third, it sheds light on the problem of diversity and conflict in the workplace, and, fourth, it focuses on the common tasks/activities, work schedules, job training, peer relations, career patterns, shared symbols, and other elements that comprise an occupation. These elements focus on how work influences social conduct and identity both in and out of the work environment. Each profession has a history of its own, above and beyond the limited context of a given organization.[260]

Research Implications

More research is needed in the area of nurse and patient outcomes in relation to organizational (hospital) subcultures. The US Institute of Medicine[128], emphasizing nurses' contribution to patient outcomes, has already called on researchers to pursue this direction. Several factors influence the nursing practice environment and nurses' practices and interventions. These factors need more attention and closer exploration in order to improve patient safety and nurses' work life.

My next steps following from this study include several research activities.

To run the same model in other nurse specialties (i.e., pediatrics, psychiatry, and operating/recovery room), first of all with the same data in order to compare findings among specialties. Second, when new appropriate data (e.g., direct measurement of adverse patient events) have been collected, I would like to examine several findings from various nurse specialty subcultures.

To generate new data for practices and emotional concerns, but with other cultural manifestations (i.e., espoused and inferred values, and cultural forms) as well. This approach is consistent with the need for triangulation in studying organizational culture and subcultures: a qualitative approach for depth and a quantitative approach for confirmation.

To examine nurse subcultures with boundaries (e.g., nursing units) in order to clarify any differences in cultural manifestations among specialty and unit subcultures. I believe that nursing unit subculture, even though it represents smaller subcultural units, will prove to be stronger due to the presence of managers and the contribution of their leadership skills to subculture.

To investigate adverse patient events (e.g., mortality) in association with hospital subcultures with non-administrative (e.g., information from patients and family) data on adverse events.

Finally, I would like to run the same causal models in Greece, in order to explore whether similar or different causal mechanisms exist there. However, it is obvious that, to do that, I will need new non-administrative data with actual patient outcomes.

Conclusion

Overall, the study of organizational culture in healthcare organizations is underdeveloped. Even though there are a few studies on nurse subcultures, more research is needed regarding nested hospital subcultures to better understand overall hospital culture. By bringing in Martin's framework from organizational theory, I showed how it can be put to use in studying nurse specialty subcultures. It is important to investigate professional specialty subcultures in the healthcare sector because healthcare organizations are highly dominated by specialized healthcare professionals. Also, there is a scarcity, in the literature, of theories and empirical studies on healthcare organizational subcultures and their impact on patient outcomes.

This study offers two main contributions to the development of nursing knowledge. First, I developed and tested a useable model that has clinical and policy implications. Second, by using structural equation modeling, I have identified causal mechanisms involved between nurse specialty subcultures and outcomes and have also examined cultural manifestations (e.g., informal practices) that are important in improving nurse and patient outcomes. This endeavor has also revealed a need for more research on nurse and patient outcomes and on the nursing practice environment. The findings of this study are consistent with several other studies[3,53,203,209,247,300] and the US Institute of Medicine report[128] on the critical role of nurses in patient outcomes and safety.

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Appendix A. Classification and Justification of Items for Inclusion in the Study

Appendix A. Classification and Justification of Items for Inclusion in the Study

Based on Martin's[9] approach to studying culture, I examined nurse professional culture across hospitals and nurse specialty subcultures. This study is characterized by three attributes. First, it is an etic approach, where cultural manifestations are deduced from prior theory and research, not from the collected data. Second, it is nomothetic research, where generalizability is the goal in order to develop a theory. And, third, it is a specialist study, since I examined a small number of cultural manifestations based on recent empirical evidence.

As mentioned in Chapter 4, this study is based on secondary data analysis, that is, the Alberta Nurse Survey data set. To study organizational (hospital) culture and nurse specialty subcultures, I examined the Nursing Work Index (NWI) and the Maslach Burnout Inventory (MBI) as instruments measuring cultural manifestations. Also, I attempted to test whether they capture other aspects of organizations and describe culture. Empirical findings sometimes lead to a refinement of existing measures or raise the need for different indicators. I drew items from two sections of the Alberta Nurse Survey: section B (NWI) and section C (MBI). The remaining sections of the survey cannot be conceptualized as cultural manifestations, since they refer to other practice-environment characteristics. These characteristics are: a) Employment characteristics (section A), b) Staffing (section D), c) Details of the last shift (section E), d) Demographic characteristics (section F), and e) a set of questions addressing restructuring, workplace violence, and the use of information resources (section G) (Appendix B).

I first assessed all the NWI and MBI survey items to see which items should remain part of this study, that is, whether they adequately represent one of the theoretical categories of cultural manifestations, cultural forms, practices (formal and informal), or content themes (espoused values, inferred values, and emotional concerns). The NWI items were classified as cultural manifestations of formal or informal practices (Table B1), while those of the Maslach Burnout Inventory were classified as to whether they constituted emotional concerns (Table B2). From the above Tables, I chose the cultural manifestations for this study. I included ideational (i.e., informal practices and emotional concerns) and material (i.e., formal practices) manifestations as part of organization culture. These manifestations were selected, first, because they are consistent with my conceptual definition of culture (Chapter 3, p.14), second, because emotional concerns refer to a deeper level of cultural manifestations that form basic assumptions, and, third, because they are available in the data set I used for this study.

Selection of Items from the NWI

The NWI measures culture, even though investigators using this instrument have never referred to culture as the studied concept in their publications. For instance, Aiken's work is based on Kramer's early publications on magnet hospitals[3-8]. Kramer's team has used the concept of culture in their articles describing the characteristics of healthcare organizations known as institutions of excellence (magnet hospitals). Aiken and

colleagues referred to the organizational attributes or context that nurses cited as important in the magnet hospitals [e.g., status of nurses, nurse autonomy, control over practice environment, accountability and continuity of care, and an "established culture"[1] (p.774)]. From the above, I made the assumption that Aiken and associates conceptualized culture as an element of organization/unit context.

The Nursing Work Index (NWI) measures processes and relationships between healthcare professionals, capturing nurses' perceptions of their practice environment. On the other hand, Schein[12] and Martin[9] claimed that culture is all about interpretation and that what matters is how people interpret their environment, with such interpretations amounting to a description of the environment. Regarding this point, I should explain the reason that NWI measures nurses' perceptions rather than their interpretations. Perception of a practice environment is an individual's response to stimuli in the internal or external environment, taking into account both the person and the environment, where that person's attributes or personal characteristics may contribute more to the perception than do the objective attributes of the environment[2]. Interpretations of the work environment are usually collected by methods other than survey questionnaires (e.g., interviews and observations).

I drew on Martin's work[9] to theoretically justify the 51 survey items in section B (NWI), developing the following inclusion/exclusion criteria:

a) An item should refer to one of the cultural manifestations, specifically to formal or informal practices. The distinctive characteristics of these cultural types are depicted in Table B1.
b) All items used in magnet hospital studies should be included. Magnet hospital studies are important to my project because they explore environment characteristics that affect outcomes (nurse and patient). I want to study the same characteristics from a cultural perspective and with advanced statistical analyses (LISREL). There is evidence that magnet hospitals have seven of the eight characteristics that Peters and Waterman[11] studied in their book "In search for excellence", which is a cultural study.
c) The item referring to salary should be included because, as Martin[9] indicated, it represents rare and important information for cultural studies.
d) The items included in this study should be representative of all cultural types, taking into account the nature of the available data set.

Based on the first criterion, I classified the items in section B as follows:

B1. "Adequate support services allow me to spend time with my patients": This is an informal practice that occurs regularly in order that nurses will have time to spend with their patients. It is included in magnet hospital studies.

B2. "Physicians and nurses have good working relationships": This is an unwritten rule that addresses an informal behavioral norm or social interaction. It is included in magnet hospital studies.

B3. "A good orientation program for newly employed nurses": This is a formal practice.

B4. "A supervisory staff that is supportive of the nurses": An informal regular practice by supervisors that nurses interpret from their surroundings and by interacting with supervisors.
B5. "A satisfactory salary": A written rule that Martin argued is a rare and important formal practice.
B6. "Nursing controls its own practice": An unwritten informal practice as a regular way of practicing nursing. Included in magnet hospital studies.
B7. "Active staff development or continuing education programs for nurses": A written rule considered to be a formal practice.
B8. "Career development/clinical ladder opportunity": A written rule considered to be a formal practice.
B9. "Opportunity for staff nurses to participate in policy decisions": A formal practice.
B10. "Support for new and innovative ideas about patient care": An informal regular practice by supervisors that nurses interpret by interacting with supervisors.
B11. "Enough time and opportunity to discuss patient care problems with other nurses": An informal practice that nurses experience by interacting with other nurses. Included in magnet hospital studies.
B12. "Enough registered nurses on staff to provide quality patient care": A formal practice. Included in magnet hospital studies.
B13. "A nurse manager or immediate supervisor who is a good manager and leader": An informal practice resulting from the interpretation of interactions with managers. Refers to behavioral norms and is included in magnet hospital studies.
B14. "A senior nursing administrator who is highly visible and accessible to staff": An informal regular practice by administrators that nurses interpret as a behavioral norm.
B15. "Flexible or modified work schedules are available": An unwritten informal rule for regular practice.
B16. "Enough staff to get work done": A formal rule based on which hospitals hire staff.
B17. "Freedom to make important patient care and work decisions": An informal practice in everyday work decisions. Included in magnet hospital studies.
B18. "Praise and recognition for a job well done": An informal regular behavioral norm.
B19. "The opportunity for staff nurses to consult with clinical nurse specialists or expert nurse clinicians/educators": An informal regular practice that nurses interpret as a behavioral norm.
B20. "Good working relationships with other hospital departments or programs": An informal practice in everyday work interactions.
B21. "Not being placed in a position of having to do things that are against my nursing judgment": An informal practice that is included in magnet hospital studies.
B22. "High standards of nursing care are expected by the administration": A formal written rule.
B23. "A senior nursing administrator equal in power and authority to other top-level hospital executives": A formal practice.
B24. "A lot of team work between nurses and physicians": An informal practice in everyday work interactions. Included in magnet hospital studies.

B25. "Physicians give high-quality medical care": An inferred value that nurses believe physicians hold. It is not included among the cultural manifestations because this item is not relevant to organizational culture.
B26. "Opportunities for advancement": A written formal rule.
B27. "Nursing staff is supported in pursuing degrees in nursing": A written formal rule.
B28. "A clear philosophy of nursing that pervades the patient care environment": An informal practice.
B29. "Nurses actively participate in efforts to control costs": An informal practice.
B30. "Working with nurses who are clinically competent": An informal practice based on nurses' experience of everyday practice. Included in magnet hospital studies.
B31. "The nursing staff participates in selecting new equipment": An informal practice.
B32. "A manager or supervisor who backs up the nursing staffing decision making, even if the conflict is with a physician": An informal practice in everyday work interactions with supervisors.
B33. "Administration that listens and responds to employee concerns": An informal regular practice that nurses experience in interaction with administrators.
B34. "An active quality assurance program": A written rule and formal practice. This item is relevant and important to increase quality of care and reduce adverse patient events.
B35. "Staff nurses are involved in the internal governance of the hospital (e.g., practice and policy committees)": A formal practice.
B36. "Collaboration between nurses and physicians": An informal practice in everyday work interactions.
B37. "A preceptor program for newly hired RNs": A written rule and a formal practice. This item is relevant and important to increase quality of care and reduce adverse patient events.
B38. "Nursing care is based on a nursing rather than a medical model": An informal regular practice.
B39. "Staff nurses have the opportunity to serve on hospital and nursing committees": A formal practice.
B40. "The contributions that nurses make to patient care are publicly acknowledged": An informal practice based on a behavioral norm.
B41. "Nurse managers or clinical supervisors consult with staff on daily problems and procedures": An informal practice based on a behavioral norm.
B42. "A work environment that is pleasant, attractive, and comfortable": A subjective opinion based on nurses' tastes and interpretation of their surroundings. It is not relevant to culture and thus is not included among the cultural manifestations.
B43. "Opportunity to work on a highly specialized patient care unit": It is not clear whether this statement refers to a nurse's choice of a nursing unit to work at when she/he is hired or if there is an opportunity for floating or moving to another more specialized unit. It is not included among the cultural manifestations.
B44. "Written, up-to-date nursing care plans for all patients": An informal practice as a regular way of practicing nursing.

B45. "Patient care assignments that foster continuity of care, i.e., the same nurse cares for the patient from one day to the next": An informal practice as a regular way of practicing nursing.
B46. "Staff nurses do not have to float from their designated unit": An informal practice.
B47. "Staff nurses actively participate in developing their own work schedules (i.e., what days they work, days off, etc.)": An informal regular practice.
B48. "Each patient care unit determines its own policies and procedures": A formal practice.
B49. "Working with experienced nurses who 'know' the hospital system": An informal practice based on everyday interaction with other nurses.
B50. "RNs and LPNs have good working relationships": An informal behavioral norm or social interaction.
B51. "RNs and unlicensed assistive personnel (e.g., nursing aides, nursing assistants, etc.) have good working relationships": An informal behavioral norm or social interaction.

The NWI does not describe any cultural forms or espoused or inferred values. Rituals, organizational stories, jargon, humor, or physical arrangements (cultural forms) are not described in the survey. Espoused values are not included either, because all respondents were staff nurses, who do not care about the declared core values or propaganda of the hospital. Inferred values have not been classified based on Martin's[9] description. In addition, three items (B25, B44, and B45) were not included in the classification, as justified above. Consequently, sixteen (B3, B5, B7, B8, B9, B12, B16, B22, B23, B26, B27, B34, B35, B37, B39, and B48) of the 48 items were classified as formal and the remaining thirty-two items (B1, B2, B4, B6, B10, B11, B13, B14, B15, B17, B18, B19, B20, B21, B24, B28, B29, B30, B31, B32, B33, B36, B38, B40, B41, B44, B45, B46, B47, B49, B50, and B51) as informal practices.

Based on the second criterion, all items in magnet hospital studies were included. These nine items (B1, B2, B6, B11, B13, B17, B21, B24, and B30) represent three subscales in the magnet hospital studies (professional autonomy, control over practice, and relationships between nurses and physicians). In addition, one more item (B12) that I classified as an informal practice was also included in the magnet hospital studies as a component of one of these three subscales. Hence, I decided to transfer this item into the informal-practices group in order to keep the same items in each subscale, according to previous magnet hospital studies. Therefore, 15 items were classified as formal and 33 items as informal practices.

According to the fourth inclusion criterion (above), a representative number of items from each type of cultural manifestation (formal and informal practices) were included, namely 30% of the items classified as formal practices and 30% of those classified as informal practices. Therefore, 10 of the 33 items classified as informal practices were included in this study. Similarly, 4 of the 15 items classified as formal practices were included. Among these four, salary (B5) was first included, based on the third criterion, so I needed three more items to meet the last criterion. After consideration, I ranked the

non-included formal-practice items from the most to the least relevant to quality of care and adverse events: B34, B37, B7, B9, B22, and B46. From this order, I chose the first three as the best predictors of quality of care and adverse patient outcomes, namely, quality assurance program (B34), preceptorship program for newly hired RNs (B37), and continuing education program (B7).

Selection of Items from the MBI

The Maslach Burnout Inventory (MBI)[10] consists of three subscales: emotional exhaustion, depersonalization, and sense of personal accomplishment. I assumed that MBI measures emotional concerns as part of the content themes of cultural manifestations[9]. I then justified all the 22 items in section C (MBI) according to Martin's work[9] and based on the following inclusion/exclusion criteria (Table B2):

b) An item should refer to an emotion
c) The emotion should be related to work or patients
d) Items should be a combination of negative and positive emotions.

C1. "I feel emotionally drained from my work": This is a negative emotion related to work.
C2. "I feel used up at the end of the workday": This is a negative emotion related to work.
C3. "I feel fatigued when I get up in the morning and have to face another day on the job": This is a general emotion that does not refer exclusively to work. It also may be felt because of family problems or other concerns.
C4. "I can easily understand how my patients feel about things": Refers to nurses' understanding, not to their emotions.
C5. "I feel I treat some patients as if they were impersonal objects": A negative emotion related to patients.
C6. "Working with people all day is really a strain for me": Refers to "people," not to patients, so it is a general statement about work.
C7. "I deal very effectively with the problems of my patients": This is not an emotion but rather reflects the nurse's capacity to deal with patient problems. Capacity to deal with problems is not related to professional or organizational culture.
C8. "I feel burned-out from my work": A negative emotion related to work.
C9. "I feel I'm positively influencing other people's lives": An ambiguous statement referring to "people's lives," not to patients' lives.
C10. "I've become more callous toward people since I took this job": This is not an emotion but an ambiguous, general, and negative statement referring to the job and "people".
C11. "I worry that this job is hardening me emotionally": An emotion referring to the current job, but not related to patients.
C12. "I feel very energetic": A general emotional statement, but not related to work or patients. Feeling energetic may come from a successful personal life.
C13. I feel frustrated by my job: A negative emotion related to work.

C14. "I feel I'm working too hard on my job": A negative emotion related to the ambiguous term "hard working", not to patients or working conditions. Hence, it is not related to culture.
C15. "I don't really care what happens to some patients": A negative statement (not an emotion) referring ambiguously to "some patients".
C16. "Working directly with people puts too much stress on me": An ambiguous statement referring to "people", not to patients.
C17. "I can easily create a relaxed atmosphere with my patients": A general statement on nurse capacity, but does not refer to an emotion.
C18. "I accomplish many worthwhile things in this job": This is not an emotion.
C19. "I feel exhilarated after working closely with my patients": A positive emotion related to patients.
C20. "I feel like I'm at the end of my rope": A general negative emotion, not clearly related to work.
C21. "In my work, I deal with emotional problems very calmly": Not an emotion but an ambiguous statement on "deal[ing] with emotional problems".
C22. "I feel patients blame me for some of their problems": A thought or belief pertaining to a postulated hostile behavior by "some patients". This is not an emotion related to patients.

Overall, six items met all the inclusion criteria: C1, C2, C8, and C13, as referring to emotional concerns related to work, and C5 and C19, as referring to emotions related to patients. Based on the representativeness inclusion criterion (30%), I needed seven items referring to emotional concerns. Thus, it could be argued that I should have included all these items. However, after further consideration, I decided to include one of the three subscales of MBI: emotional exhaustion (EE). This choice was guided by the rationale that EE is the most relevant subscale referring to an emotion related to work or patients (first and second inclusion criteria). In addition, it is a standardized instrument for measuring emotional concerns at work.

Therefore, three informal (professional autonomy, control over practice, and relationships between nurses and physicians) and four formal (salary, quality assurance, preceptorship, and continuing education) practices, as well as the emotional exhaustion 9-item subscale, were included in this study as cultural manifestations.

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Table B1. NWI as Cultural Manifestations

No	NWI Items	Formal Practices	Informal Practices
B1	Adequate support services allow me to spend time with my patients		v
B2	Physicians and nurses have good working relationships		v
B3	A good orientation program for newly employed nurses	v	
B4	A supervisory staff that is supportive of the nurses		v
B5	A satisfactory salary	v	
B6	Nursing controls its own practice		v
B7	Active staff development or continuing education programs for nurses	v	
B8	Career development / clinical ladder opportunity	v	
B9	Opportunity for staff nurses to participate in policy decisions	v	
B10	Support for new and innovative ideas about patient care		v
B11	Enough time and opportunity to discuss patient care problems with other nurses		v
B12	Enough registered nurses on staff to provide quality patient care	v	
B13	A nurse manager or immediate supervisor who is a good manager and leader		v
B14	A senior nursing administrator who is highly visible and accessible to staff		v
B15	Flexible or modified work schedules are available		v
B16	Enough staff get work done	v	
B17	Freedom to make important patient care and work decisions		v
B18	Praise and recognition for a job well done		v
B19	The opportunity for staff nurses to consult with clinical nurse specialists or expert nurse educators		v
B20	Good working relationships with other hospital departments or programs		v
B21	Not being placed in a position of having to do things that are against my nursing judgment		v
B22	High standards of nursing care are expected by the administration	v	
B23	A senior nursing administrator equal in power and authority to other top-level hospital executives	v	
B24	A lot of team work between nurses and physicians		v
B25	Physicians give high quality medical care		
B26	Opportunities for advancement	v	

B27	Nursing staff are supported in pursuing degrees in nursing	v	
B28	A clear philosophy of nursing that pervades the patient care environment		v
B29	Nurses actively participate in efforts to control costs		v
B30	Working with nurses who are clinically competent		v
B31	The nursing staff participates in selecting new equipment		v
B32	A manager or supervisor who backs up the nursing staffing decision making, even if the conflict is with a physician		v
B33	Administration that listens and responds to employee concerns		v
B34	An active quality assurance program	v	
B35	Staff nurses are involved in the internal governance of the hospital (e.g., policy committees)	v	
B36	Collaboration between nurses and physicians		v
B37	A preceptor program for newly hired RNs	v	
B38	Nursing care is based on a nursing rather than a medical model		v
B39	Staff nurses have the opportunity to serve on hospital and nursing committees	v	
B40	The contributions that nurses make to patient care are publicly acknowledged		v
B41	Nurse managers or clinical supervisors consult with staff on daily problems & procedures		v
B42	A work environment that is pleasant, attractive, and comfortable.		
B43	Opportunity to work on a highly specialized patient care unit		
B44	Written, up-to-date nursing care plans for all patients		v
B45	Patient care assignments that foster continuity of care, i.e., the same nurse cares for the patient from one day to the next		v
B46	Staff nurses do not have to float from their designated unit		v
B47	Staff nurses actively participate in developing their own work schedules (e.g., days off)		v
B48	Each patient care unit determines its own policies and procedures	v	
B49	Working with experienced nurses who "know" the hospital system		v
B50	RNs and LPNs have good working relationships		v
B51	RNs and unlicensed assistive personnel have good working relationships		v

Table B2. MBI as Cultural Manifestations

No	MBI Items	Emotional Concerns
C1	I feel emotionally drained from my work.	v
C2	I feel used up at the end of the workday	v
C3	I feel fatigued when I get up in the morning and have to face another day on the job	
C4	I can easily understand how my patients feel about things	
C5	I feel I treat some patients as if they were impersonal objects	
C6	Working with people all day is really a strain for me	v
C7	I deal very effectively with the problems of my patients	
C8	I feel burned-out from my work	v
C9	I feel I'm positively influencing other people's lives	
C10	I've become more callous toward people since I took this job	
C11	I worry that this job is hardening me emotionally	
C12	I feel very energetic	
C13	I feel frustrated by my job	v
C14	I feel I'm working too hard on my job	v
C15	I don't really care what happens to some patients	
C16	Working directly with people puts too much stress on me	v
C17	I can easily create a relaxed atmosphere with my patients	
C18	I accomplish many worthwhile things in this job	
C19	I feel exhilarated after working closely with my patients	v
C20	I feel like I'm at the end of my rope	v
C21	In my work, I deal with emotional problems very calmly	
C22	I feel patients blame me for some of their problems	

Appendix B. Alberta Registered Nurse Survey

Alberta Registered Nurse Survey

of

Hospital Characteristics

There are 14 pages to this survey. Please circle **only one number** per question, unless otherwise directed.

Participation in this study is voluntary. Your consent is given when you return the survey. The survey itself contains no identifying information. However, the return envelope included in this package has a code number on it so that reminders can be mailed to nurses who have not returned the survey. We will try as much as possible to avoid surveys and reminders crossing in the mail, but this does happen sometimes.

The data from the survey (with no identifying information from any of the participants) will be kept for a minimum of seven years in accordance with the University of Alberta research policy. After the study is completed, other analysis of the survey data will be conducted. If required, ethical approval will be obtained to do these analyses. The anonymous survey data will eventually be stored in the University of Alberta data library where it will be available to other researchers.

This survey is one component of an *International Study of Hospital Organization and Staffing on Patient Outcomes* involving Canada (British Columbia, Alberta, and Ontario), the United States, England, Scotland, and Germany.

The Alberta Study Team at the Faculties of Nursing, University of Alberta and University of Calgary, The United Nurses of Alberta (UNA), and the Alberta Association of Registered Nurses (AARN) would like to thank you for your participation in this study. If you have questions or concerns about this survey questionnaire please call the study Project Director at (403) 492-2996.

September 1998

The purpose of this study is to help us identify hospital characteristics so that we can look at the effect of those characteristics on patient outcomes. However, we realize that currently many nurses work at more than one hospital. When you answer the questions on this survey, please do so with only one hospital in mind. You may choose any one of the hospitals that you work at, hospitals are listed below and on the next page by regional authority. If you work at more than one hospital and would like to complete a questionnaire for an additional hospital please call the Project Office @ 403- 492-2996 and we will mail you an additional survey.
CHOOSE AND CIRCLE CLEARLY ONE HOSPITAL THAT YOU WORK AT FOR THIS SURVEY:

Chinook Regional Health Authority 1
018 Crowsnest Pass Hospital (Blairmore)
019 Border Counties General Hosp. (Milk River)
020 Cardston Hospital
021 Picture Butte Municipal Hospital
022 Coaldale Health Care Centre
023 Pincher Creek Municipal Hospital
024 Fort Macleod Health Care Centre
025 Raymond General Hospital
026 Lethbridge Regional Hospital
027 Taber & District Health Care Complex

Palliser Regional Health Authority 2
028 Bassano General Hospital
029 Empress Health Centre
030 Bow Island Health Centre
031 Medicine Hat Regional Hospital
032 Brooks Health Centre
033 Oyen Big Country Hospital

Headwaters Regional Health Authority 3
034 Banff Mineral Springs Hospital
035 High River General Hospital
036 Canmore Hospital
037 Oilfields General Hosp. (Black Diamond)
038 Claresholm General Hospital
039 Vulcan Community Health Centre

Calgary Regional Health Authority 4
040 Alberta Children's Hospital
041 Rocky View General Hospital
042 Foothills Medical Centre
043 Peter Lougheed Centre

Health Region 5
044 Cereal Municipal Hospital
045 Hanna District Health Services
046 Didsbury District Health Services
047 Three Hills District Health Services
048 Drumheller District Health Services
049 Strathmore District Health Services

David Thompson Regional Health Authority 6
050 Innisfail Health Care Centre
051 Rimbey General Hospital
052 Lacombe General Hospital
053 Rocky Mountain House General Hospital
054 Olds Municipal General Hospital
055 Trochu-St. Mary's Health Care Centre
056 Ponoka General Hospital
057 Sundre General Hospital
058 Red Deer Regional Hospital Centre

East Central Regional Health Authority 7
059 St. Mary's Hospital (Camrose)
060 Mannville Health Centre
061 Our Lady of the Rosary Hospital (Castor)
062 Provost Health Centre
063 Consort Municipal Hospital
064 Stettler Hospital/Health Centre
065 Coronation Health Centre
066 Tofield Health Centre
067 Daysland Health Centre
068 Vermilion Health Centre
069 Hardisty Health Centre
070 Viking Health Centre
071 Killam Health Care Centre
072 Wainwright Health Centre

Westview Regional Health Authority 8
073 Devon General Hospital
074 Seton General Hospital (Jasper)
075 Edson & District Health Care Centre
076 Stony Plain Municipal Hospital
077 Hinton General Hospital

... continued on next page

Crossroads Regional Health Authority 9

078 Breton General Hospital
079 Leduc Health Centre
080 Drayton Valley Health Centre
081 Wetaskiwin Health Centre

Capital Health Authority 10

082 Misericordia Hosp & Comm. Health Centre
083 University of Alberta Hospital
084 Royal Alexandra Hospital
085 Grey Nuns Hosp & Comm Health Centre
086 Sturgeon Hospital & Comm. Health Centre
087 Glenrose Rehabilitation Hospital

Aspen Regional Health Authority 11

088 Athabasca Healthcare Centre
089 Mayerthorpe Healthcare Centre
090 Barrhead Healthcare Centre
091 Swan Hills Healthcare Centre
092 Boyle Healthcare Centre
093 Westlock Health care Centre
094 Fox Creek Hospital/Healthcare Centre
095 Whitecourt Healthcare Centre

Lakeland Regional Health Authority 12

096 Bonnyville Health Centre
097 Redwater General Hospital
098 Cold Lake Regional Hospital
099 George McDougall Mem Hosp (Smoky Lake)
100 Elk Point Municipal Hospital
101 Ste. Theresa Health Centre (St. Paul)
102 Fort Saskatchewan General Hospital
103 Two Hills Health Care Centre
104 William J. Cadzow Hospital (Lac La Biche)
105 St. Joseph's General Hospital (Vegreville)
106 Lamont Health Care Centre
107 Our Lady's Health Centre (Vilna)
108 Mary Immaculate Hospital (Mundare)
109 Mary Immaculate Hospital (Willingdon)

Mistahia Regional Health Authority 13

110 Beaverlodge Municipal Hospital
111 Grimshaw/Berwyn & District Hospital
112 Fairview Health Complex
113 Central Peace General Hospital (Spirit River)
114 Grande Cache General Hospital
115 Valleyview Health Centre
116 Queen Elizabeth II Hosp (Grande Prairie)

Peace Regional Health Authority 14

117 Manning General Hospital
118 Peace River Community Health Centre
119 Sacred Heart Community Health Centre (McLennan)

Keeweetinok Regional Health Authority 15

120 High Prairie Health Complex
121 Wabasca/Desmarais General Hospital
122 Slave Lake General Hospital

Northern Lights Regional Health Authority 16

123 Northern Lights Regional Health Centre (Fort McMurray)

Northwestern Regional Health Authority 17

124 St. Theresa General Hosp (Fort Vermilion)
125 High Level General Hospital

Alberta Cancer Board

126 Tom Baker Centre, Calgary
127 Cross Cancer Agency, Edmonton

Provincial Mental Health

128 Alberta Hospital
129 Ponoka Hospital

Other (please specify): _____( )

A. EMPLOYMENT CHARACTERISTICS: This section asks questions about your job as an RN. Please circle the number of the appropriate response to each question or, where indicated, fill in the blanks.

PLEASE REMEMBER TO ANSWER ALL REMAINING QUESTIONS FROM THIS POINT ON IN RELATION TO THE ONE HOSPITAL YOU CIRCLED ABOVE.

1. Are you currently working full-time or part-time at this hospital . . . . . .
   1. Full time
   2. Part time

2. Is your employment . . . . . .
   1. Permanent
   2. Temporary
   3. Casual

3. (a) What unit do you work on? **Select the ONE unit where you work the MOST hours.**
   1. Medical
   2. Surgical
   3. Med/Surg
   4. Intensive Care
   5. Obstetrics
   6. OR/PARR
   7. Pediatrics
   8. Psychiatry
   9. Rehabilitation
   10. Palliative
   11. Chronic
   12. Emergency
   13. Day/Night care
   14. Clinics
   15. Other
   Specify: _____ ( )

   (b) If you work in **all** units in your hospital ✓ here ⇒ 16. ☐

4. What is your job title?
   1. staff nurse
   2. other, specify: _____ ( )

5. How many years have you worked...
   (a) as an RN? _____ years
   (b) as an RN at your present hospital _____ years
   (c) on your current unit(s)? _____ years

6. a. Is your immediate clinical supervisor a. . . .
   1. nurse
   2. other, specify _____ ( )

   b. Is your unit or programme manager a. . . .
   1. nurse
   2. other, specify _____ ( )

7. In the past year, how many hours per week did you work, on average?
   _____ hours per week

8. In the past year, how many hours per week, on average, did you work on units other than the one to which you are usually assigned (that is, the one where you work the most hours)?
   _____ hours per week

9. What is the length of your usual regularly scheduled shift?
   1. 8 hours
   2. 12 hours
   3. 8 and/or 12 hours
   4. other (specify: _____ hr)

10. In the past year, about how many hours per week did you work
    .... paid overtime _____ hours per week
    ..... unpaid overtime _____ hours per week

11. In the past year, has the amount of overtime required of you ...
    1. increased
    2. remained the same
    3. decreased
    4. not applicable

12. In the past two weeks, how often did you change shifts (e.g, change from days to evenings or nights)?
    1. none
    2. once
    3. twice
    4. other (specify: _____)

B. NURSING WORK INDEX (NWI): For each item in this section, please indicate the extent to which you agree that the following items ARE PRESENT IN YOUR CURRENT JOB. Indicate your degree of agreement by circling the appropriate number.

	The following are present in your current job . . .	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
1.	Adequate support services allow me to spend time with my patients.	1	2	3	4
2.	Physicians and nurses have good working relationships.	1	2	3	4
3.	A good orientation program for newly employed nurses.	1	2	3	4
4.	A supervisory staff that is supportive of the nurses.	1	2	3	4
5.	A satisfactory salary.	1	2	3	4
6.	Nursing controls its own practice	1	2	3	4
7.	Active staff development or continuing education programs for nurses.	1	2	3	4
8.	Career development/clinical ladder opportunity.	1	2	3	4
9.	Opportunity for staff nurses to participate in policy decisions.	1	2	3	4
10.	Support for new and innovative ideas about patient care.	1	2	3	4
11.	Enough time and opportunity to discuss patient care problems with other nurses.	1	2	3	4
12.	Enough registered nurses on staff to provide quality patient care.	1	2	3	4

... continued on next page

For *each* item in this section, please indicate the extent to which you agree that the following items ARE PRESENT IN YOUR CURRENT JOB. Indicate your degree of agreement by circling the appropriate number.

	The following are present in your current job . . .	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
13.	A nurse manager or immediate supervisor who is a good manager and leader.	1	2	3	4
14.	A senior nursing administrator who is highly visible and accessible to staff.	1	2	3	4
15.	Flexible or modified work schedules are available.	1	2	3	4
16.	Enough staff to get work done.	1	2	3	4
17.	Freedom to make important patient care and work decisions.	1	2	3	4
18.	Praise and recognition for a job well done.	1	2	3	4
19.	The opportunity for staff nurses to consult with clinical nurse specialists or expert nurse clinicians/educators.	1	2	3	4
20.	Good working relationships with other hospital departments or programmes.	1	2	3	4
21.	Not being placed in a position of having to do things that are against my nursing judgment.	1	2	3	4
22.	High standards of nursing care are expected by the administration.	1	2	3	4
23.	A senior nursing administrator equal in power and authority to other top level hospital executives	1	2	3	4
24.	A lot of team work between nurses and physicians.	1	2	3	4
25.	Physicians give high quality medical care.	1	2	3	4
26.	Opportunities for advancement.	1	2	3	4
27.	Nursing staff are supported in pursuing degrees in nursing.	1	2	3	4
28.	A clear philosophy of nursing that pervades the patient care environment.	1	2	3	4
29.	Nurses actively participate in efforts to control costs.	1	2	3	4
30.	Working with nurses who are clinically competent.	1	2	3	4
31.	The nursing staff participates in selecting new equipment.	1	2	3	4
32.	A manager or supervisor who backs up the nursing staff in decision making, even if the conflict is with a physician.	1	2	3	4

. . . continued on next page

For *each* item in this section, please indicate the extent to which you agree that the following items ARE PRESENT IN YOUR CURRENT JOB. Indicate your degree of agreement by circling the appropriate number.

	The following are present in your current job . . .	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
33.	Administration that listens and responds to employee concerns.	1	2	3	4
34.	An active quality assurance program.	1	2	3	4
35.	Staff nurses are involved in the internal governance of the hospital (e.g., practice and policy committees).	1	2	3	4
36.	Collaboration between nurses and physicians.	1	2	3	4
37.	A preceptor program for newly hired RNs.	1	2	3	4
38.	Nursing care is based on a nursing rather than a medical model.	1	2	3	4
39.	Staff nurses have the opportunity to serve on hospital and nursing committees.	1	2	3	4
40.	The contributions that nurses make to patient care are publicly acknowledged.	1	2	3	4
41.	. Nurse managers or clinical supervisors consult with staff on daily problems and procedures.	1	2	3	4
42.	A work environment that is pleasant, attractive, and comfortable.	1	2	3	4
43.	Opportunity to work on a highly specialized patient care unit.	1	2	3	4
44.	Written, up-to-date nursing care plans for all patients.	1	2	3	4
45.	Patient care assignments that foster continuity of care, i.e., the same nurse cares for the patient from one day to the next.	1	2	3	4
46.	Staff nurses do not have to float from their designated unit.	1	2	3	4
47.	Staff nurses actively participate in developing their own work schedules (i.e., what days they work, days off, etc.)	1	2	3	4
48.	Each patient care unit determines its own policies and procedures.	1	2	3	4
49.	Working with experienced nurses who "know" the hospital system.	1	2	3	4
50.	RNs and LPNs have good working relationships.	1	2	3	4
51.	RNs and unlicensed assistive personnel (e.g., nursing aides, nursing assistants, etc.) have good working relationships.	1	2	3	4

For *each* item in this section, please indicate the extent to which you agree that the following items ARE PRESENT IN YOUR CURRENT JOB. Indicate your degree of agreement by circling the appropriate number.

	The following are present in your current job . . .	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
33.	Administration that listens and responds to employee concerns.	1	2	3	4
34.	An active quality assurance program.	1	2	3	4
35.	Staff nurses are involved in the internal governance of the hospital (e.g., practice and policy committees).	1	2	3	4
36.	Collaboration between nurses and physicians.	1	2	3	4
37.	A preceptor program for newly hired RNs.	1	2	3	4
38.	Nursing care is based on a nursing rather than a medical model.	1	2	3	4
39.	Staff nurses have the opportunity to serve on hospital and nursing committees.	1	2	3	4
40.	The contributions that nurses make to patient care are publicly acknowledged.	1	2	3	4
41.	. Nurse managers or clinical supervisors consult with staff on daily problems and procedures.	1	2	3	4
42.	A work environment that is pleasant, attractive, and comfortable.	1	2	3	4
43.	Opportunity to work on a highly specialized patient care unit.	1	2	3	4
44.	Written, up-to-date nursing care plans for all patients.	1	2	3	4
45.	Patient care assignments that foster continuity of care, i.e., the same nurse cares for the patient from one day to the next.	1	2	3	4
46.	Staff nurses do not have to float from their designated unit.	1	2	3	4
47.	Staff nurses actively participate in developing their own work schedules (i.e., what days they work, days off, etc.)	1	2	3	4
48.	Each patient care unit determines its own policies and procedures.	1	2	3	4
49.	Working with experienced nurses who "know" the hospital system.	1	2	3	4
50.	RNs and LPNs have good working relationships.	1	2	3	4
51.	RNs and unlicensed assistive personnel (e.g., nursing aides, nursing assistants, etc.) have good working relationships.	1	2	3	4

D. JOB CHARACTERISTICS: This section asks about your job as an RN and asks for your views about the care on your nursing unit and in your hospital. Please circle the number of the appropriate response to each question or, where indicated, fill in the blanks.

1. On the whole, how satisfied are you with your present job?
   1. very dissatisfied
   2. a little dissatisfied
   3. moderately satisfied
   4. very satisfied

2. Independent of your present job, how satisfied are you with being a nurse?
   1. very dissatisfied
   2. a little dissatisfied
   3. moderately satisfied
   4. very satisfied

3. Thinking about the next 12 months, how likely do you think it is that you will lose your job or be laid off?
   1. very likely
   2. fairly likely
   3. not too likely
   4. not at all likely

4. Do you plan to leave your present nursing position?
   1. yes, within the next 6 mo
   2. yes, within the next 12 mo
   3. no plans within the next year

5. If you were looking for another job, how easy or difficult do you think it would be for you to find a satisfactory job in nursing?
   1. very easy
   2. fairly easy
   3. fairly difficult
   4. very difficult

6. The following descriptions are intended to represent levels of skill and ability in nursing roles and functions. Which one of the following would you say ***best describes*** the way **you** practice on your unit?

   I am a nurse who: (circle only **one** response)

   1 ...relies primarily on standards of care, unit procedures, and physicians' and nurses' orders to guide patient care.
   2 ...has increased clinical understanding, technical and organizational skills, and is able to anticipate the likely course of events.
   3 ...perceives the patient situation as a whole and responds appropriately as conditions change.
   4 ...is good at recognizing unexpected clinical responses and often provides an early warning of patient changes.

7. In general, how would you describe the quality of nursing care delivered to patients on your unit?
   1. excellent
   2. good
   3. fair
   4. poor

8. Over the past year, how often would you say each of the following incidents has occurred involving you or your patients? Circle the appropriate response

	never	rarely	occasionally	frequently
1. Patient received wrong medication or dose	1	2	3	4
2. Nosocomial infections	1	2	3	4
3. Complaints from patients or their families	1	2	3	4
4. Patient falls with injuries	1	2	3	4
5. Work-related injuries to employees	1	2	3	4
6. Incidents of verbal abuse directed toward RN	1	2	3	4

9. Overall, over the **past year** would you say the quality of patient care in your hospital has

1. improved
2. remained the same
3. deteriorated

10. Have any of the following changes occurred in your hospital **in the past year**? *(circle all that apply)*

1. Increase in number of positions for advanced practice nurses (e.g., CNSs)
2. Increase in number of patients assigned to RNs
3. Substitution of part-time, per diem, or temporary RNs for full-time positions
4. Reduction in number of nurse managers
5. Increase in cross-training of staff
6. Loss of senior nurse administrator *without* replacement
7. Loss of senior nurse administrator *with* replacement
8. Hiring of unlicensed assistive personnel (e.g., personal care attendants, nursing aides) to provide direct patient care previously provided by RNs

11. How has the hiring of unlicensed assistive personnel affected the quality of care in your hospital?

The quality has. . .
1. improved
2. remained the same
3. deteriorated
4. not applicable, or no change in hiring of unlicensed assistive personnel

12. How confident are you that the patients you care for are able to manage their care when discharged from hospital?

1. very confident
2. confident
3. somewhat confident
4. not at all confident

13. How confident are you that management will act to resolve the patient care problems that you report?

1. very confident
2. confident
3. somewhat confident
4. not at all confident

14. If a member of your family needed health care, would you recommend that it be provided in your hospital?

1. yes
2. no

15. Have you ever been stuck with a needle or sharp that had been used on a patient?

1. Yes
2. No

IF YES:

a. How many times has this occurred *in your nursing* career? _____ times
b. How many of these incidents occurred *in the past year*? _____ incidents
c. How many of these incidents occurred *in the past month*? _____ incidents

16. Which of the following protective devices are routinely used in your work setting?

(circle all that apply)

1. Self-capping / retractable needles
2. Needleless IV tubing systems
3. Needleless heparin locks
4. Safety-lock syringes
5. Blunt needles / cannula
6. Blunt needle IV

E. LAST SHIFT: This section asks you questions about your nursing activities during the LAST FULL SHIFT that you worked. Please circle the number of the appropriate response to each question or, where indicated, fill in the blanks.

1. What was the last shift you worked?

   1. Days
   2. Evenings
   3. Nights

2. On what type of unit did you work during your last shift?

   1. Medical
   2. Surgical
   3. Med/Surg
   4. Intensive Care
   5. Obstetrics
   6. OR/PARR
   7. Pediatrics
   8. Psychiatry
   9. Rehabilitation
   10. Palliative
   11. Chronic
   12. Emergency
   13. Day/Night care
   14. Clinics
   15. Other
       Specify: _____

3. How many beds (staffed and in service) are on that unit? _____ # of beds

4. How many patients were on your unit during your last shift? _____ # of patients on unit.

5. How many of these patients were assigned to you? _____ # of patients

6. Sort these patients into the following categories according to their care needs (the numbers in lines 1-4 should equal the number in question 5 above: *ADL refers to Activities of Daily Living*)

   1. _____ Need assistance with all ADLs
   2. _____ Need assistance with most ADLs
   3. _____ Need assistance with some ADLs
   4. _____ Mostly self care

7. How many of each of the following worked on your unit during your last shift.

   _____ # of RNs
   _____ # of LPNs
   _____ # of unlicensed assistive personnel
   _____ # of nursing students

8. How many of the RNs in Question 7 are not regular members of the unit staff (e.g., are from the float pool, casual, etc.)? _____ # of RNs

9. How many of the LPNs in Question 7 did you supervise? _____ # of LPNs

10. How many of the unlicensed assistive personnel (UAP) in Question 7 did you supervise? _____ # of UAPs

11. How many of the nursing students in Question 7 did you supervise? _____ # of students

12. Which, if any, of the following tasks did you perform during your **last shift?**
(circle all that apply)

1. Delivering and retrieving food trays
2. Ordering, coordinating, or performing ancillary services (e.g., physio, ordering lab work)
3. Starting IVs
4. Arranging discharge referrals and transportation (including to nursing homes)
5. Performing ECGs
6. Routine phlebotomy
7. Transporting of patients
8. Housekeeping duties (e.g., cleaning patient rooms)

13. Which of the following tasks were necessary but left undone because you lacked the time to complete them? *(circle all that apply)*

1. Routine teaching for patients and family
2. Prepare patients and families for discharge
3. Comforting/talking with patients
4. Adequately document nursing care
5. Back rubs and skin care
7. Oral hygiene
8. Developing or updating nursing care plans

14. How would you describe the quality of nursing care delivered on your last shift?

1. excellent
2. good
3. fair
4. poor

F. DEMOGRAPHIC CHARACTERISTICS: This section asks you general questions about you and your background. Please circle the number of the appropriate response to each question or, where indicated, fill in the blanks.

1. What is your sex? 1. female 2. male

2. What is your age? _____ years

3. In what country did you receive your basic nursing education?
1. Canada
2. Other (specify): ____ ( )

4. Do you have any dependent children or other dependent relatives who live with you? 1. Yes 2. No

5. What is your highest **registered nurse** credential?
1. diploma
2. baccalaureate
3. masters
4. other (specify: _____) ( )

G. ALBERTA QUESTIONS: The questions in this section are a separate set of questions specifically for Alberta nurses. Please answer each one as indicated. Some of the questions may seem out of sequence, this is because each country or province has added their particular questions as a grouped set at the end of the survey.

If you do not wish to proceed any further through the questionnaire, this is a good place to stop. However, we hope you will take the time to complete the Alberta sections, which include important questions on restructuring, and on violence in the workplace.

G1: Restructuring and employment

1. If you are employed on a casual (ie, non-permanent) basis, is this by your choice? 1. Yes 2. No

   If you answered ? no? to the last question how long have you been casual ? ____ years ____ months

2. Have you been laid off in the last 5 years? 1. Yes 2. No
   If you answered yes please complete 2a and 2b

   a. How many times were you laid off in the last **5 years**? _____ times

   b. Were you rehired by the same hospital? 1. Yes 2. No

3. Have you changed nursing units in the last 5 years due to downsizing? 1. Yes 2. No
   If you answered yes please complete 3a and 3b

   a. How many times were you required to change nursing units during this 5 year period? _____ times

   b. How adequate was the orientation provided on the new unit to meet your learning needs?
   1. not at all adequate
   2. somewhat adequate
   3. mostly adequate
   4. very adequate

G2: These questions ask your opinion about your patients? readiness for discharge. Please circle the one response that best describes your opinion.

1. How involved are you in discharge planning for the care of your patients who are discharged from hospital and require professional nursing care in the home or other community setting?

   1. very involved (involvement has increased since patients have been discharged earlier)
   2. somewhat involved (level of involvement has not changed)
   3. rarely involved
   4. not involved at all in discharge planning

2. How confident are you that patients you care for are discharged from hospital with adequate (in your opinion) home care or other community services that they require?
   1. very confident
   2. confident
   3. somewhat confident
   4. not at all confident

3. How confident are you that your patients? families or primary support persons have the resources to assist with patients' self-care needs upon discharge when required?
   1. very confident
   2. confident
   3. somewhat confident
   4. not at all confident

G3: Violence in the Workplace

The intent of this series of questions is to gain an understanding of the amount and type of violence experienced by nurses in the workplace. We are also interested in knowing about the responses of nurses and their employers to violent episodes. Please use the following definition of violence as you answer the questions.

Violence against nurses or nurse abuse is defined in this study as any incident where a nurse experiences any of the following:

a. physical assault (e.g. being spit on, bitten, hit, pushed)
b. threat of assault (verbal or written threats intending harm)
c. emotional abuse such as hurtful attitudes or remarks (insults, gestures, humiliation before the work team, coercion),
d. verbal sexual harassment (repeated, unwanted intimate questions or remarks of a sexual nature)
e. sexual assault (any forced physical sexual contact including forcible touching and fondling, any forced sexual acts including forcible intercourse)

We know that 5 shifts is a very short time and you may have experienced these events outside of this period, but please answer based on the last 5 shifts you worked. Because we are asking so many nurses, the 5 shift period will give us a clear starting point to understanding how much violence exists today in the workplace.

1. In the **LAST 5 SHIFTS YOU WORKED**, have you experienced any of the following while carrying out your responsibilities as a nurse? **Circle all that apply.**

			Who was it from? (circle one for each "yes" answer)				
a. physical assault	1. yes	2. no	1.patient	2.family/visitor	3.physician	4.nursing co-worker	5. other
b. threat of assault	1. yes	2. no	1.patient	2.family/visitor	3.physician	4.nursing co-worker	5. other
c. emotional abuse	1. yes	2. no	1.patient	2.family/visitor	3.physician	4.nursing co-worker	5. other
d. verbal sexual harassement	1. yes	2. no	1.patient	2.family/visitor	3.physician	4.nursing co-worker	5. other
e. sexual assault	1. yes	2. no	1.patient	2.family/visitor	3.physician	4.nursing co-worker	5. Other

2. Did you report any of the following

1. physical assault	1. yes	2. no	3. not applicable
2. threat of assault	1. yes	2. no	3. not applicable
3. emotional abuse	1. yes	2. no	3. not applicable
4. verbal sexual harassment	1. yes	2. no	3. not applicable
5. sexual assault	1. yes	2. no	3. not applicable

3. Of the **last 5 shifts** that you worked how many, if any, did you work alone? _____ shifts
(i.e., you were the only employee on the unit)?

4. Please indicate the extent to which you agree with the following statements:

My employer has implemented measures to prevent violence against nurses in the workplace (e.g., zero tolerance policy, education, conflict management programmes, etc)

1. strongly agree
2. agree
3. disagree
4. strongly disagree

5. My well-being (i.e., my emotional health) when carrying out my responsibilities as a registered nurse is not as good as it was one year ago.

1. strongly agree
2. agree
3. disagree
4. strongly disagree

6. Please indicate how often, if ever, the following statement is true:

I fear for my personal safety when carrying out my responsibilities as a registered nurse.

1. on most of the shifts I work
2. on more than half of my shifts
3. on less than half of my shifts
4. on an occasional shift
5. never

G4: Clinical resources

1. How often are you selected to be a preceptor for another nurse?

1. never
2. rarely
3. occasionally
4. frequently

2. How often do nurses come to you for clinical judgement on a difficult clinical problem?

1. never
2. rarely
3. occasionally
4. frequently

G5: Resources that may influence how nurses find and use knowledge for practice

1. (a) Do you have a computer at home..... 1. Yes 2. No
   (b) Do you use the computer at home..... 1. Yes 2. No

2. How much time **per week** on average do you spend at **HOME** on the following:

	none	<1 hr	1-4 hr	5-10 hr	>10 hr
(a) e-mail only	1	2	3	4	5
(b) the Internet (generally).....	1	2	3	4	5
(c) the Internet (seeking nursing practice information).....	1	2	3	4	5

3. (a) Do you have access to a computer at work (ie, one you can use)..... 1. Yes 2. No
   (b) Do you use this computer at work ..... 1. Yes 2. No

4. How much time **per week** on average do you spend at WORK on the following activities. This is **IN ADDITION** to any hospital or mainframe computer work you *must* do, e.g., to enter medications, order procedures, monitor patients, etc:

	none	<1 hr	1-4 hr	5-10 hr	>10 hr
(a) e-mail only					
(b) the Internet (generally).....					
(c) the Internet (seeking nursing practice information)					

5. How many hours **per week** in total would you spend on the Internet getting information **that would assist you in your nursing practice?** (if none put ? 0")

_____ hours

THANK YOU FOR TAKING THE TIME TO COMPLETE AND RETURN THIS QUESTIONNAIRE!

Appendix C. Syntax Used in SEM with LISREL

Syntax 5.1 - Model I: Original (Pairwise, Split1)

```
Title: Organizational Culture and Adverse Patient Events: C:\Desktop\Dissertation\AB-Split1
DA NI=16 NO=971 MA=CM SY
CM
0.690
0.172 0.403
-0.061 -0.082 0.924
-0.019 0.007 -0.291 30.240
-0.002 0.005 -0.023 0.036 0.242
0.156 0.070 0.009 0.018 0.044 0.697
0.174 0.092 -0.035 -0.063 0.037 0.148 0.809
0.150 0.121 -0.069 0.185 0.028 0.077 0.244 0.598
0.152 0.103 -0.049 0.168 -0.002 0.009 0.180 0.143 0.915
0.508 0.331 -0.117 -0.204 0.042 0.391 0.528 0.473 0.385 2.813
0.992 0.838 -0.125 -0.852 0.075 0.733 0.902 0.814 0.669 2.744 8.076
0.322 0.226 -0.118 0.076 -0.023 0.203 0.271 0.224 0.241 0.926 1.355 1.717
-5.318 -2.252 1.005 -3.008 -0.805 -2.555 -2.329 -2.090 -2.193 -7.465 -15.148 -3.786 121.245
-0.005 -0.010 0.032 0.072 0.017 0.008 0.017 0.009 -0.017 -0.016 0.007 -0.080 -0.038 0.218
0.055 0.065 -0.062 0.050 -0.026 0.021 -0.013 0.011 0.063 0.085 0.214 0.095 -0.900 -0.075 0.178
-0.021 -0.035 -0.043 0.171 0.001 -0.031 0.019 -0.008 0.004 -0.064 -0.176 0.053 0.525 -0.049 -0.036
0.130
LA
'satisjob' 'qoc' 'apes' 'yrs_unit' 'ftptpr' 'salary' 'cntined' 'quality' 'precep' 'autonomy' 'controlo' 'relation' 'ee'
'dsurg' 'dicu' 'der'
SE
'satisjob' 'qoc' 'apes' 'yrs_unit' 'ftptpr' 'salary' 'cntined' 'quality' 'precep' 'autonomy' 'controlo' 'relation' 'ee'
'dsurg' 'dicu' 'der'
MO NY=3 NX=13 NE=3 NK=13 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10) LX(11,11) LX(12,12) LX(13,13)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(1,5) GA(3,3) GA(2,3)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.034 TE(1,1)
VA 0.040 TE(2,2)
VA 0.185 TE(3,3)
VA 0.302 TD(1,1)
VA 0.002 TD(2,2)
VA 0.035 TD(3,3)
VA 0.040 TD(4,4)
VA 0.030 TD(5,5)
VA 0.046 TD(6,6)
VA 0.281 TD(7,7)
VA 0.808 TD(8,8)
VA 0.172 TD(9,9)
VA 6.062 TD(10,10)
VA 0.002 TD(11,11)
VA 0.002 TD(12,12)
VA 0.001 TD(13,13)
OU ML ALL AD=OFF ND=3
```

Syntax 5.2 - Model I: Final (Pairwise, Split1)

```
Title: Organizational Culture and Adverse Patient Events: C:\Desktop\Dissertation\AB-Split1
DA NI=16 NO=971 MA=CM SY
CM
0.690
0.172 0.403
-0.061 -0.082 0.924
-0.019 0.007 -0.291 30.240
-0.002 0.005 -0.023 0.036 0.242
0.156 0.070 0.009 0.018 0.044 0.697
0.174 0.092 -0.035 -0.063 0.037 0.148 0.809
0.150 0.121 -0.069 0.185 0.028 0.077 0.244 0.598
0.152 0.103 -0.049 0.168 -0.002 0.009 0.180 0.143 0.915
0.508 0.331 -0.117 -0.204 0.042 0.391 0.528 0.473 0.385 2.813
0.992 0.838 -0.125 -0.852 0.075 0.733 0.902 0.814 0.669 2.744 8.076
0.322 0.226 -0.118 0.076 -0.023 0.203 0.271 0.224 0.241 0.926 1.355 1.717
-5.318 -2.252 1.005 -3.008 -0.805 -2.555 -2.329 -2.090 -2.193 -7.465 -15.148 -3.786 121.245
-0.005 -0.010 0.032 0.072 0.017 0.008 0.017 0.009 -0.017 -0.016 0.007 -0.080 -0.038 0.218
0.055 0.065 -0.062 0.050 -0.026 0.021 -0.013 0.011 0.063 0.085 0.214 0.095 -0.900 -0.075 0.178
-0.021 -0.035 -0.043 0.171 0.001 -0.031 0.019 -0.008 0.004 -0.064 -0.176 0.053 0.525 -0.049 -0.036
0.130
LA
'satisjob' 'qoc' 'apes' 'yrs_unit' 'ftptpr' 'salary' 'cntined' 'quality' 'precep' 'autonomy' 'controlo' 'relation' 'ee'
'dsurg' 'dicu' 'der'
SE
'satisjob' 'qoc' 'apes' 'yrs_unit' 'ftptpr' 'salary' 'cntined' 'quality' 'precep' 'autonomy' 'controlo' 'relation' 'ee'
'dsurg' 'dicu' 'der'
MO NY=3 NX=13 NE=3 NK=13 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10) LX(11,11) LX(12,12) LX(13,13)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(1,5) GA(3,3)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.034 TE(1,1)
VA 0.040 TE(2,2)
VA 0.185 TE(3,3)
VA 0.302 TD(1,1)
VA 0.002 TD(2,2)
VA 0.035 TD(3,3)
VA 0.040 TD(4,4)
VA 0.030 TD(5,5)
VA 0.046 TD(6,6)
VA 0.281 TD(7,7)
VA 0.808 TD(8,8)
VA 0.172 TD(9,9)
VA 6.062 TD(10,10)
VA 0.002 TD(11,11)
VA 0.002 TD(12,12)
VA 0.001 TD(13,13)
OU ML ALL AD=OFF ND=3
```

Syntax 5.3 – Model I: Original (Listwise, Split1)

```
Title: Organizational Culture and Adverse Patient Events: C:\Desktop\Dissertation\AB-Split1
DA NI=16 NO=819 MA=CM SY
CM
0.683
0.182 0.401
-0.059 -0.082 0.915
0.071 0.017 -0.279 29.494
-0.010 -0.006 -0.011 0.016 0.243
0.162 0.083 0.004 0.099 0.040 0.675
0.164 0.088 -0.046 0.007 0.031 0.143 0.793
0.141 0.124 -0.070 0.223 0.017 0.078 0.229 0.584
0.145 0.096 -0.045 0.121 -0.010 -0.006 0.159 0.131 0.925
0.507 0.329 -0.132 -0.288 0.022 0.402 0.488 0.452 0.349 2.758
1.045 0.843 -0.151 -0.756 0.040 0.757 0.867 0.790 0.628 2.709 8.020
0.342 0.223 -0.138 0.092 -0.029 0.193 0.259 0.223 0.205 0.912 1.335 1.709
-5.260 -2.329 1.044 -3.450 -0.773 -2.510 -2.269 -2.058 -2.292 -7.418 -14.877 -3.734 120.766
-0.001 -0.014 0.037 0.053 0.017 0.010 0.014 0.003 -0.011 -0.017 -0.015 -0.095 -0.017 0.215
0.056 0.074 -0.068 0.016 -0.032 0.017 -0.012 0.016 0.065 0.088 0.242 0.098 -0.946 -0.076 0.184
-0.023 -0.036 -0.045 0.183 0.004 -0.035 0.027 -0.002 0.003 -0.059 -0.173 0.060 0.506 -0.050 -0.038
0.134
LA
'satisjob' 'qoc' 'apes' 'yrs_unit' 'ftptpr' 'salary' 'cntined' 'quality' 'precep' 'autonomy' 'controlo' 'relation' 'ee'
'dsurg' 'dicu' 'der'
SE
'satisjob' 'qoc' 'apes' 'yrs_unit' 'ftptpr' 'salary' 'cntined' 'quality' 'precep' 'autonomy' 'controlo' 'relation' 'ee'
'dsurg' 'dicu' 'der'
MO NY=3 NX=13 NE=3 NK=13 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10) LX(11,11) LX(12,12) LX(13,13)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(1,5) GA(3,3) GA(2,3)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.034 TE(1,1)
VA 0.040 TE(2,2)
VA 0.183 TE(3,3)
VA 0.295 TD(1,1)
VA 0.002 TD(2,2)
VA 0.034 TD(3,3)
VA 0.040 TD(4,4)
VA 0.029 TD(5,5)
VA 0.046 TD(6,6)
VA 0.276 TD(7,7)
VA 0.802 TD(8,8)
VA 0.171 TD(9,9)
VA 6.038 TD(10,10)
VA 0.002 TD(11,11)
VA 0.002 TD(12,12)
VA 0.001 TD(13,13)
OU ML ALL AD=OFF ND=3
```

Syntax 5.4 – Model I: Final (Listwise, Split1)

```
Title: Organizational Culture and Adverse Patient Events: C:\Desktop\Dissertation\AB-Split1
DA NI=16 NO=819 MA=CM SY
CM
0.683
0.182 0.401
-0.059 -0.082 0.915
0.071 0.017 -0.279 29.494
-0.010 -0.006 -0.011 0.016 0.243
0.162 0.083 0.004 0.099 0.040 0.675
0.164 0.088 -0.046 0.007 0.031 0.143 0.793
0.141 0.124 -0.070 0.223 0.017 0.078 0.229 0.584
0.145 0.096 -0.045 0.121 -0.010 -0.006 0.159 0.131 0.925
0.507 0.329 -0.132 -0.288 0.022 0.402 0.488 0.452 0.349 2.758
1.045 0.843 -0.151 -0.756 0.040 0.757 0.867 0.790 0.628 2.709 8.020
0.342 0.223 -0.138 0.092 -0.029 0.193 0.259 0.223 0.205 0.912 1.335 1.709
-5.260 -2.329 1.044 -3.450 -0.773 -2.510 -2.269 -2.058 -2.292 -7.418 -14.877 -3.734 120.766
-0.001 -0.014 0.037 0.053 0.017 0.010 0.014 0.003 -0.011 -0.017 -0.015 -0.095 -0.017 0.215
0.056 0.074 -0.068 0.016 -0.032 0.017 -0.012 0.016 0.065 0.088 0.242 0.098 -0.946 -0.076 0.184
-0.023 -0.036 -0.045 0.183 0.004 -0.035 0.027 -0.002 0.003 -0.059 -0.173 0.060 0.506 -0.050 -0.038
0.134
LA
'satisjob' 'qoc' 'apes' 'yrs_unit' 'ftptpr' 'salary' 'cntined' 'quality' 'precep' 'autonomy' 'controlo' 'relation' 'ee'
'dsurg' 'dicu' 'der'
SE
'satisjob' 'qoc' 'apes' 'yrs_unit' 'ftptpr' 'salary' 'cntined' 'quality' 'precep' 'autonomy' 'controlo' 'relation' 'ee'
'dsurg' 'dicu' 'der'
MO NY=3 NX=13 NE=3 NK=13 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10) LX(11,11) LX(12,12) LX(13,13)
FR BE(2,1) BE(3,1) BE(3,2)
FI              GA(1,5) GA(3,3)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.034 TE(1,1)
VA 0.040 TE(2,2)
VA 0.183 TE(3,3)
VA 0.295 TD(1,1)
VA 0.002 TD(2,2)
VA 0.034 TD(3,3)
VA 0.040 TD(4,4)
VA 0.029 TD(5,5)
VA 0.046 TD(6,6)
VA 0.276 TD(7,7)
VA 0.802 TD(8,8)
VA 0.171 TD(9,9)
VA 6.038 TD(10,10)
VA 0.002 TD(11,11)
VA 0.002 TD(12,12)
VA 0.001 TD(13,13)
OU ML ALL AD=OFF ND=3
```

Syntax 5.5 – Model I: Original (Pairwise, Split2)

```
Title: NSSCs and Nurse & Patient Outcomes: C:\Desktop\Dissertation\AB-Split2
DA NI=16 NO=942 MA=CM SY
CM
0.729
0.221 0.455
-0.076 -0.127 0.934
-0.022 0.084 -0.405 30.235
-0.011 -0.007 -0.030 0.243 0.238
0.126 0.033 0.046 -0.036 0.032 0.779
0.191 0.092 -0.058 -0.138 0.051 0.128 0.842
0.135 0.107 -0.049 0.213 0.026 0.068 0.203 0.606
0.132 0.081 -0.105 0.370 -0.001 0.099 0.202 0.176 0.960
0.543 0.367 -0.188 -0.281 -0.007 0.352 0.577 0.436 0.435 2.892
1.085 0.802 -0.296 -0.551 0.037 0.574 0.813 0.627 0.653 2.560 7.786
0.301 0.204 -0.141 -0.037 -0.025 0.167 0.184 0.158 0.279 1.036 1.149 1.820
-5.296 -2.248 1.610 -1.103 -0.739 -2.123 -2.095 -1.331 -1.469 -6.791 -13.473 -2.186 120.907
0.006 -0.004 -0.014 -0.126 0.008 -0.009 0.009 0.009 -0.041 -0.003 -0.020 -0.120 -0.059 0.213
0.012 0.037 -0.040 -0.005 -0.030 -0.003 -0.036 -0.011 0.068 0.026 0.201 0.055 -0.567 -0.077 0.188
-0.020 -0.032 -0.049 0.228 0.005 -0.025 0.012 -0.005 0.005 -0.024 -0.148 0.105 0.405 -0.047 -0.039
0.131
LA
'satisjob' 'qoc' 'apes' 'yrs_unit' 'ftptpr' 'salary' 'cntined' 'quality' 'precep' 'autonomy' 'controlo' 'relation' 'ee'
'dsurg' 'dicu' 'der'
SE
'satisjob' 'qoc' 'apes' 'yrs_unit' 'ftptpr' 'salary' 'cntined' 'quality' 'precep' 'autonomy' 'controlo' 'relation' 'ee'
'dsurg' 'dicu' 'der'
MO NY=3 NX=13 NE=3 NK=13 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10) LX(11,11) LX(12,12) LX(13,13)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(1,5) GA(3,3) GA(2,3)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.036 TE(1,1)
VA 0.046 TE(2,2)
VA 0.187 TE(3,3)
VA 0.302 TD(1,1)
VA 0.002 TD(2,2)
VA 0.039 TD(3,3)
VA 0.042 TD(4,4)
VA 0.030 TD(5,5)
VA 0.048 TD(6,6)
VA 0.289 TD(7,7)
VA 0.779 TD(8,8)
VA 0.182 TD(9,9)
VA 6.045 TD(10,10)
VA 0.002 TD(11,11)
VA 0.002 TD(12,12)
VA 0.001 TD(13,13)
OU ML ALL AD=OFF ND=3
```

Syntax 5.6 – Model I: Final (Pairwise, Split2)

```
Title: NSSCs and Nurse & Patient Outcomes: C:\Desktop\Dissertation\AB-Split2
DA NI=16 NO=966 MA=CM SY
CM
0.729
0.221 0.455
-0.076 -0.127 0.934
-0.022 0.084 -0.405 30.235
-0.011 -0.007 -0.030 0.243 0.238
0.126 0.033 0.046 -0.036 0.032 0.779
0.191 0.092 -0.058 -0.138 0.051 0.128 0.842
0.135 0.107 -0.049 0.213 0.026 0.068 0.203 0.606
0.132 0.081 -0.105 0.370 -0.001 0.099 0.202 0.176 0.960
0.543 0.367 -0.188 -0.281 -0.007 0.352 0.577 0.436 0.435 2.892
1.085 0.802 -0.296 -0.551 0.037 0.574 0.813 0.627 0.653 2.560 7.786
0.301 0.204 -0.141 -0.037 -0.025 0.167 0.184 0.158 0.279 1.036 1.149 1.820
-5.296 -2.248 1.610 -1.103 -0.739 -2.123 -2.095 -1.331 -1.469 -6.791 -13.473 -2.186 120.907
0.006 -0.004 -0.014 -0.126 0.008 -0.009 0.009 0.009 -0.041 -0.003 -0.020 -0.120 -0.059 0.213
0.012 0.037 -0.040 -0.005 -0.030 -0.003 -0.036 -0.011 0.068 0.026 0.201 0.055 -0.567 -0.077 0.188
-0.020 -0.032 -0.049 0.228 0.005 -0.025 0.012 -0.005 0.005 -0.024 -0.148 0.105 0.405 -0.047 -0.039
0.131
LA
'satisjob' 'qoc' 'apes' 'yrs_unit' 'ftptpr' 'salary' 'cntined' 'quality' 'precep' 'autonomy' 'controlo' 'relation' 'ee'
'dsurg' 'dicu' 'der'
SE
'satisjob' 'qoc' 'apes' 'yrs_unit' 'ftptpr' 'salary' 'cntined' 'quality' 'precep' 'autonomy' 'controlo' 'relation' 'ee'
'dsurg' 'dicu' 'der'
MO NY=3 NX=13 NE=3 NK=13 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10) LX(11,11) LX(12,12) LX(13,13)
FR BE(2,1) BE(3,1) BE(3,2)
FI                GA(1,5) GA(3,3)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.036 TE(1,1)
VA 0.046 TE(2,2)
VA 0.187 TE(3,3)
VA 0.302 TD(1,1)
VA 0.002 TD(2,2)
VA 0.039 TD(3,3)
VA 0.042 TD(4,4)
VA 0.030 TD(5,5)
VA 0.048 TD(6,6)
VA 0.289 TD(7,7)
VA 0.779 TD(8,8)
VA 0.182 TD(9,9)
VA 6.045 TD(10,10)
VA 0.002 TD(11,11)
VA 0.002 TD(12,12)
VA 0.001 TD(13,13)
OU ML ALL AD=OFF ND=3
```

Syntax 5.7 – Model I: Original (Listwise, Split2)

```
Title: NSSCs and Nurse & Patient Outcomes: C:\Desktop\Dissertation\AB-Split2
DA NI=16 NO=966 MA=CM SY
CM
0.710
0.205 0.443
-0.071 -0.132 0.915
-0.020 0.122 -0.260 28.806
-0.012 -0.006 -0.036 0.235 0.239
0.129 0.048 0.061 -0.008 0.024 0.783
0.198 0.092 -0.030 -0.247 0.053 0.132 0.833
0.111 0.102 -0.055 0.233 0.025 0.050 0.190 0.585
0.127 0.083 -0.109 0.289 0.002 0.091 0.208 0.176 0.949
0.528 0.344 -0.150 -0.216 -0.016 0.333 0.566 0.426 0.427 2.864
1.066 0.815 -0.301 -0.454 0.029 0.568 0.829 0.599 0.653 2.527 7.815
0.288 0.193 -0.121 -0.040 -0.021 0.178 0.172 0.151 0.271 1.004 1.106 1.833
-4.901 -2.079 1.753 -1.146 -0.716 -1.961 -2.209 -1.043 -1.213 -6.512 -12.881 -1.824 116.528
0.004 -0.004 -0.006 -0.037 0.007 -0.013 0.013 0.011 -0.029 0.003 -0.043 -0.126 -0.087 0.213
0.011 0.042 -0.044 -0.016 -0.031 -0.001 -0.034 -0.006 0.071 0.031 0.216 0.064 -0.549 -0.077 0.188
-0.021 -0.035 -0.055 0.169 0.004 -0.024 0.004 -0.011 0.004 -0.028 -0.141 0.108 0.456 -0.047 -0.038
0.129
LA
'satisjob' 'qoc' 'apes' 'yrs_unit' 'ftptpr' 'salary' 'cntined' 'quality' 'precep' 'autonomy' 'controlo' 'relation' 'ee'
'dsurg' 'dicu' 'der'
SE
'satisjob' 'qoc' 'apes' 'yrs_unit' 'ftptpr' 'salary' 'cntined' 'quality' 'precep' 'autonomy' 'controlo' 'relation' 'ee'
'dsurg' 'dicu' 'der'
MO NY=3 NX=13 NE=3 NK=13 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10) LX(11,11) LX(12,12) LX(13,13)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(1,5) GA(3,3) GA(2,3)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.035 TE(1,1)
VA 0.044 TE(2,2)
VA 0.183 TE(3,3)
VA 0.288 TD(1,1)
VA 0.002 TD(2,2)
VA 0.039 TD(3,3)
VA 0.042 TD(4,4)
VA 0.029 TD(5,5)
VA 0.047 TD(6,6)
VA 0.286 TD(7,7)
VA 0.781 TD(8,8)
VA 0.183 TD(9,9)
VA 5.826 TD(10,10)
VA 0.002 TD(11,11)
VA 0.002 TD(12,12)
VA 0.001 TD(13,13)
OU ML ALL AD=OFF ND=3
```

Syntax 5.8 – Model I: Final (Listwise, Split2)

```
Title: NSSCs and Nurse & Patient Outcomes: C:\Desktop\Dissertation\AB-Split2
DA NI=16 NO=815 MA=CM SY
CM
0.710
0.205 0.443
-0.071 -0.132 0.915
-0.020 0.122 -0.260 28.806
-0.012 -0.006 -0.036 0.235 0.239
0.129 0.048 0.061 -0.008 0.024 0.783
0.198 0.092 -0.030 -0.247 0.053 0.132 0.833
0.111 0.102 -0.055 0.233 0.025 0.050 0.190 0.585
0.127 0.083 -0.109 0.289 0.002 0.091 0.208 0.176 0.949
0.528 0.344 -0.150 -0.216 -0.016 0.333 0.566 0.426 0.427 2.864
1.066 0.815 -0.301 -0.454 0.029 0.568 0.829 0.599 0.653 2.527 7.815
0.288 0.193 -0.121 -0.040 -0.021 0.178 0.172 0.151 0.271 1.004 1.106 1.833
-4.901 -2.079 1.753 -1.146 -0.716 -1.961 -2.209 -1.043 -1.213 -6.512 -12.881 -1.824 116.528
0.004 -0.004 -0.006 -0.037 0.007 -0.013 0.013 0.011 -0.029 0.003 -0.043 -0.126 -0.087 0.213
0.011 0.042 -0.044 -0.016 -0.031 -0.001 -0.034 -0.006 0.071 0.031 0.216 0.064 -0.549 -0.077 0.188
-0.021 -0.035 -0.055 0.169 0.004 -0.024 0.004 -0.011 0.004 -0.028 -0.141 0.108 0.456 -0.047 -0.038
0.129
LA
'satisjob' 'qoc' 'apes' 'yrs_unit' 'ftptpr' 'salary' 'cntined' 'quality' 'precep' 'autonomy' 'controlo' 'relation' 'ee'
'dsurg' 'dicu' 'der'
SE
'satisjob' 'qoc' 'apes' 'yrs_unit' 'ftptpr' 'salary' 'cntined' 'quality' 'precep' 'autonomy' 'controlo' 'relation' 'ee'
'dsurg' 'dicu' 'der'
MO NY=3 NX=13 NE=3 NK=13 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10) LX(11,11) LX(12,12) LX(13,13)
FR BE(2,1) BE(3,1) BE(3,2)
FI                      GA(1,5) GA(3,3)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.035 TE(1,1)
VA 0.044 TE(2,2)
VA 0.183 TE(3,3)
VA 0.288 TD(1,1)
VA 0.002 TD(2,2)
VA 0.039 TD(3,3)
VA 0.042 TD(4,4)
VA 0.029 TD(5,5)
VA 0.047 TD(6,6)
VA 0.286 TD(7,7)
VA 0.781 TD(8,8)
VA 0.183 TD(9,9)
VA 5.826 TD(10,10)
VA 0.002 TD(11,11)
VA 0.002 TD(12,12)
VA 0.001 TD(13,13)
OU ML ALL AD=OFF ND=3
```

Syntax 6.1 - Four-Group Stacked Model II: Unconstrained (Pairwise)

```
Title: Organizational Culture and Adverse Patient Events Stacked Model
DA NI=13 NO=564 MA=CM NG=4 SY
CM
0.686
0.134 0.416
-0.020 -0.052 0.657
0.001 0.175 -0.322 24.929
0.021 0.017 -0.013 -0.077 0.229
0.163 0.019 0.038 -0.067 0.034 0.722
0.210 0.086 -0.056 -0.282 0.059 0.177 0.826
0.143 0.109 -0.018 0.178 0.037 0.073 0.218 0.609
0.154 0.086 -0.009 -0.015 0.038 0.045 0.158 0.157 0.956
0.511 0.321 -0.171 -0.849 0.077 0.351 0.587 0.491 0.320 2.982
0.931 0.696 -0.135 -0.060 0.146 0.606 0.897 0.678 0.446 2.718 7.476
0.259 0.201 -0.137 0.050 0.044 0.143 0.226 0.216 0.164 0.897 1.184 1.564
-5.403 -1.824 1.320 1.500 -1.002 -2.184 -2.767 -1.873 -1.874 -8.383 -14.612 -3.293 119.214
LA
'satisjom' 'qocm' 'apesm' 'yrs_unim' 'ftptprm' 'salarym' 'cntinedm' 'qualitym' 'precepm' 'autonomm'
'controlm' 'relatiom' 'eem'
SE
'satisjom' 'qocm' 'apesm' 'yrs_unim' 'ftptprm' 'salarym' 'cntinedm' 'qualitym' 'precepm' 'autonomm'
'controlm' 'relatiom' 'eem'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.034 TE(1,1)
VA 0.042 TE(2,2)
VA 0.131 TE(3,3)
VA 0.249 TD(1,1)
VA 0.002 TD(2,2)
VA 0.036 TD(3,3)
VA 0.041 TD(4,4)
VA 0.030 TD(5,5)
VA 0.048 TD(6,6)
VA 0.298 TD(7,7)
VA 0.748 TD(8,8)
VA 0.156 TD(9,9)
VA 5.961 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=608 MA=CM
CM
0.632
0.174 0.372
-0.083 -0.097 0.975
0.260 0.157 -0.070 30.352
0.006 0.018 -0.047 -0.018 0.230
0.152 0.057 0.014 -0.024 0.028 0.763
0.132 0.055 -0.004 0.149 0.014 0.168 0.778
```

```
0.129 0.092 -0.098 0.199 0.005 0.100 0.177 0.573
0.128 0.077 -0.031 0.595 0.010 0.065 0.245 0.172 0.966
0.503 0.301 -0.100 0.117 -0.010 0.441 0.510 0.433 0.390 2.883
1.030 0.664 -0.183 0.139 0.077 0.734 0.661 0.757 0.704 2.557 7.450
0.249 0.172 0.028 0.441 -0.012 0.279 0.186 0.224 0.258 0.963 1.277 1.625
-5.144 -1.902 0.941 -2.911 -0.908 -2.570 -2.023 -1.740 -1.899 -6.623 -13.617 -2.550 122.981
LA
'satisjos' 'qocs' 'apess' 'yrs_unis' 'ftptprs' 'salarys' 'cntineds' 'qualitys' 'preceps' 'autonoms' 'controls'
'relatios' 'ees'
SE
'satisjos' 'qocs' 'apess' 'yrs_unis' 'ftptprs' 'salarys' 'cntineds' 'qualitys' 'preceps' 'autonoms' 'controls'
'relatios' 'ees'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.032 TE(1,1)
VA 0.037 TE(2,2)
VA 0.195 TE(3,3)
VA 0.304 TD(1,1)
VA 0.002 TD(2,2)
VA 0.038 TD(3,3)
VA 0.039 TD(4,4)
VA 0.029 TD(5,5)
VA 0.048 TD(6,6)
VA 0.288 TD(7,7)
VA 0.745 TD(8,8)
VA 0.163 TD(9,9)
VA 6.149 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=467 MA=CM
CM
0.715
0.201 0.378
-0.033 -0.092 0.741
0.035 0.029 0.121 29.099
-0.051 -0.019 -0.019 0.587 0.250
0.109 0.055 -0.035 0.060 0.055 0.641
0.152 0.117 -0.084 -0.321 0.050 0.078 0.839
0.114 0.100 0.003 0.282 0.036 0.039 0.224 0.603
0.106 0.069 -0.131 0.006 -0.013 0.066 0.158 0.140 0.789
0.450 0.296 -0.232 0.692 -0.024 0.289 0.510 0.367 0.345 2.509
0.911 0.733 -0.262 -1.118 0.015 0.636 1.053 0.544 0.585 2.359 8.212
0.392 0.200 -0.140 -0.143 -0.027 0.160 0.230 0.138 0.255 1.090 1.383 1.696
-3.853 -1.884 0.938 -5.444 -0.758 -2.127 -1.399 -0.954 -0.852 -5.445 -10.968 -3.139 100.803
LA
'satisjoi' 'qoci' 'apesi' 'yrs_unii' 'ftptpri' 'salaryi' 'cntinedi' 'qualityi' 'precepi' 'autonomi' 'controli' 'relatioi'
'eei'
SE
'satisjoi' 'qoci' 'apesi' 'yrs_unii' 'ftptpri' 'salaryi' 'cntinedi' 'qualityi' 'precepi' 'autonomi' 'controli' 'relatioi'
'eei'
```

```
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.036 TE(1,1)
VA 0.038 TE(2,2)
VA 0.148 TE(3,3)
VA 0.291 TD(1,1)
VA 0.003 TD(2,2)
VA 0.032 TD(3,3)
VA 0.042 TD(4,4)
VA 0.030 TD(5,5)
VA 0.039 TD(6,6)
VA 0.251 TD(7,7)
VA 0.821 TD(8,8)
VA 0.170 TD(9,9)
VA 5.040 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=298 MA=CM
CM
0.857
0.276 0.537
-0.147 -0.195 1.328
-0.624 -0.183 -1.032 39.582
0.017 0.000 -0.095 0.218 0.237
0.102 0.051 0.057 0.366 0.038 0.837
0.317 0.201 -0.044 -0.015 0.046 0.135 0.887
0.207 0.183 -0.162 0.158 0.039 0.063 0.333 0.647
0.141 0.064 -0.015 0.262 -0.009 0.036 0.232 0.169 0.920
0.627 0.460 -0.068 -0.886 0.069 0.356 0.735 0.567 0.608 3.005
1.123 0.995 -0.274 -1.924 0.094 0.398 1.117 0.951 0.739 2.631 7.114
0.401 0.344 -0.011 -1.604 -0.083 0.217 0.342 0.200 0.196 1.041 1.215 1.893
-6.581 -2.659 1.912 -4.048 -0.816 -2.013 -3.686 -2.357 -1.705 -6.538 -12.871 -2.876 127.829
LA
'satisjoe' 'qoce' 'apese' 'yrs_unie' 'ftptpre' 'salarye' 'cntinede' 'qualitye' 'precepe' 'autonome' 'controle'
'relatioe' 'eee'
SE
'satisjoe' 'qoce' 'apese' 'yrs_unie' 'ftptpre' 'salarye' 'cntinede' 'qualitye' 'precepe' 'autonome' 'controle'
'relatioe' 'eee'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.043 TE(1,1)
VA 0.054 TE(2,2)
VA 0.266 TE(3,3)
VA 0.396 TD(1,1)
VA 0.002 TD(2,2)
```

VA 0.042 TD(3,3)
VA 0.044 TD(4,4)
VA 0.032 TD(5,5)
VA 0.046 TD(6,6)
VA 0.300 TD(7,7)
VA 0.711 TD(8,8)
VA 0.189 TD(9,9)
VA 6.391 TD(10,10)
OU ML ALL AD=OFF ND=3

Syntax 6.2 - Four-Group Stacked Model II: Original (Pairwise)

```
Title: Organizational Culture and Adverse Patient Events Stacked Model
DA NI=13 NO=544 MA=CM NG=4 SY
CM
0.686
0.134 0.416
-0.020 -0.052 0.657
0.001 0.175 -0.322 24.929
0.021 0.017 -0.013 -0.077 0.229
0.163 0.019 0.038 -0.067 0.034 0.722
0.210 0.086 -0.056 -0.282 0.059 0.177 0.826
0.143 0.109 -0.018 0.178 0.037 0.073 0.218 0.609
0.154 0.086 -0.009 -0.015 0.038 0.045 0.158 0.157 0.956
0.511 0.321 -0.171 -0.849 0.077 0.351 0.587 0.491 0.320 2.982
0.931 0.696 -0.135 -0.060 0.146 0.606 0.897 0.678 0.446 2.718 7.476
0.259 0.201 -0.137 0.050 0.044 0.143 0.226 0.216 0.164 0.897 1.184 1.564
-5.403 -1.824 1.320 1.500 -1.002 -2.184 -2.767 -1.873 -1.874 -8.383 -14.612 -3.293 119.214
LA
'satisjom' 'qocm' 'apesm' 'yrs_unim' 'ftptprm' 'salarym' 'cntinedm' 'qualitym' 'precepm' 'autonomm'
'controlm' 'relatiom' 'eem'
SE
'satisjom' 'qocm' 'apesm' 'yrs_unim' 'ftptprm' 'salarym' 'cntinedm' 'qualitym' 'precepm' 'autonomm'
'controlm' 'relatiom' 'eem'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.034 TE(1,1)
VA 0.042 TE(2,2)
VA 0.131 TE(3,3)
VA 0.249 TD(1,1)
VA 0.002 TD(2,2)
VA 0.036 TD(3,3)
VA 0.041 TD(4,4)
VA 0.030 TD(5,5)
VA 0.048 TD(6,6)
VA 0.298 TD(7,7)
VA 0.748 TD(8,8)
VA 0.156 TD(9,9)
VA 5.961 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=588 MA=CM
CM
0.632
0.174 0.372
-0.083 -0.097 0.975
0.260 0.157 -0.070 30.352
0.006 0.018 -0.047 -0.018 0.230
0.152 0.057 0.014 -0.024 0.028 0.763
0.132 0.055 -0.004 0.149 0.014 0.168 0.778
```

```
0.129 0.092 -0.098 0.199 0.005 0.100 0.177 0.573
0.128 0.077 -0.031 0.595 0.010 0.065 0.245 0.172 0.966
0.503 0.301 -0.100 0.117 -0.010 0.441 0.510 0.433 0.390 2.883
1.030 0.664 -0.183 0.139 0.077 0.734 0.661 0.757 0.704 2.557 7.450
0.249 0.172 0.028 0.441 -0.012 0.279 0.186 0.224 0.258 0.963 1.277 1.625
-5.144 -1.902 0.941 -2.911 -0.908 -2.570 -2.023 -1.740 -1.899 -6.623 -13.617 -2.550 122.981
LA
'satisjos' 'qocs' 'apess' 'yrs_unis' 'ftptprs' 'salarys' 'cntineds' 'qualitys' 'preceps' 'autonoms' 'controls'
'relatios' 'ees'
SE
'satisjos' 'qocs' 'apess' 'yrs_unis' 'ftptprs' 'salarys' 'cntineds' 'qualitys' 'preceps' 'autonoms' 'controls'
'relatios' 'ees'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
EQ BE (1,3,2) BE(3,2)
EQ GA(1,1,4) GA(1,4)
EQ GA(1,2,4) GA(2,4)
EQ GA(1,3,4) GA(3,4)
VA 0.032 TE(1,1)
VA 0.037 TE(2,2)
VA 0.195 TE(3,3)
VA 0.304 TD(1,1)
VA 0.002 TD(2,2)
VA 0.038 TD(3,3)
VA 0.039 TD(4,4)
VA 0.029 TD(5,5)
VA 0.048 TD(6,6)
VA 0.288 TD(7,7)
VA 0.745 TD(8,8)
VA 0.163 TD(9,9)
VA 6.149 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=456 MA=CM
CM
0.715
0.201 0.378
-0.033 -0.092 0.741
0.035 0.029 0.121 29.099
-0.051 -0.019 -0.019 0.587 0.250
0.109 0.055 -0.035 0.060 0.055 0.641
0.152 0.117 -0.084 -0.321 0.050 0.078 0.839
0.114 0.100 0.003 0.282 0.036 0.039 0.224 0.603
0.106 0.069 -0.131 0.006 -0.013 0.066 0.158 0.140 0.789
0.450 0.296 -0.232 0.692 -0.024 0.289 0.510 0.367 0.345 2.509
0.911 0.733 -0.262 -1.118 0.015 0.636 1.053 0.544 0.585 2.359 8.212
0.392 0.200 -0.140 -0.143 -0.027 0.160 0.230 0.138 0.255 1.090 1.383 1.696
-3.853 -1.884 0.938 -5.444 -0.758 -2.127 -1.399 -0.954 -0.852 -5.445 -10.968 -3.139 100.803
LA
```

```
'satisjoi' 'qoci' 'apesi' 'yrs_unii' 'ftptpri' 'salaryi' 'cntinedi' 'qualityi' 'precepi' 'autonomi' 'controli' 'relatioi'
'eei'
SE
'satisjoi' 'qoci' 'apesi' 'yrs_unii' 'ftptpri' 'salaryi' 'cntinedi' 'qualityi' 'precepi' 'autonomi' 'controli' 'relatioi'
'eei'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
EQ GA(1,2,5) GA(2,5)
EQ GA(1,3,5) GA(3,5)
VA 0.036 TE(1,1)
VA 0.038 TE(2,2)
VA 0.148 TE(3,3)
VA 0.291 TD(1,1)
VA 0.003 TD(2,2)
VA 0.032 TD(3,3)
VA 0.042 TD(4,4)
VA 0.030 TD(5,5)
VA 0.039 TD(6,6)
VA 0.251 TD(7,7)
VA 0.821 TD(8,8)
VA 0.170 TD(9,9)
VA 5.040 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=290 MA=CM
CM
0.857
0.276 0.537
-0.147 -0.195 1.328
-0.624 -0.183 -1.032 39.582
0.017 0.000 -0.095 0.218 0.237
0.102 0.051 0.057 0.366 0.038 0.837
0.317 0.201 -0.044 -0.015 0.046 0.135 0.887
0.207 0.183 -0.162 0.158 0.039 0.063 0.333 0.647
0.141 0.064 -0.015 0.262 -0.009 0.036 0.232 0.169 0.920
0.627 0.460 -0.068 -0.886 0.069 0.356 0.735 0.567 0.608 3.005
1.123 0.995 -0.274 -1.924 0.094 0.398 1.117 0.951 0.739 2.631 7.114
0.401 0.344 -0.011 -1.604 -0.083 0.217 0.342 0.200 0.196 1.041 1.215 1.893
-6.581 -2.659 1.912 -4.048 -0.816 -2.013 -3.686 -2.357 -1.705 -6.538 -12.871 -2.876 127.829
LA
'satisjoe' 'qoce' 'apese' 'yrs_unie' 'ftptpre' 'salarye' 'cntinede' 'qualitye' 'precepe' 'autonome' 'controle'
'relatioe' 'eee'
SE
'satisjoe' 'qoce' 'apese' 'yrs_unie' 'ftptpre' 'salarye' 'cntinede' 'qualitye' 'precepe' 'autonome' 'controle'
'relatioe' 'eee'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5)LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
```

```
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.043 TE(1,1)
VA 0.054 TE(2,2)
VA 0.266 TE(3,3)
VA 0.396 TD(1,1)
VA 0.002 TD(2,2)
VA 0.042 TD(3,3)
VA 0.044 TD(4,4)
VA 0.032 TD(5,5)
VA 0.046 TD(6,6)
VA 0.300 TD(7,7)
VA 0.711 TD(8,8)
VA 0.189 TD(9,9)
VA 6.391 TD(10,10)
OU ML ALL AD=OFF ND=3
```

Syntax 6.3 - Four-Group Stacked Model II: Final (Pairwise)

```
Title: Organizational Culture and Adverse Patient Events Stacked Model
DA NI=13 NO=544 MA=CM NG=4 SY
CM
0.686
0.134 0.416
-0.020 -0.052 0.657
0.001 0.175 -0.322 24.929
0.021 0.017 -0.013 -0.077 0.229
0.163 0.019 0.038 -0.067 0.034 0.722
0.210 0.086 -0.056 -0.282 0.059 0.177 0.826
0.143 0.109 -0.018 0.178 0.037 0.073 0.218 0.609
0.154 0.086 -0.009 -0.015 0.038 0.045 0.158 0.157 0.956
0.511 0.321 -0.171 -0.849 0.077 0.351 0.587 0.491 0.320 2.982
0.931 0.696 -0.135 -0.060 0.146 0.606 0.897 0.678 0.446 2.718 7.476
0.259 0.201 -0.137 0.050 0.044 0.143 0.226 0.216 0.164 0.897 1.184 1.564
-5.403 -1.824 1.320 1.500 -1.002 -2.184 -2.767 -1.873 -1.874 -8.383 -14.612 -3.293 119.214
LA
'satisjom' 'qocm' 'apesm' 'yrs_unim' 'ftptprm' 'salarym' 'cntinedm' 'qualitym' 'precepm' 'autonomm'
'controlm' 'relatiom' 'eem'
SE
'satisjom' 'qocm' 'apesm' 'yrs_unim' 'ftptprm' 'salarym' 'cntinedm' 'qualitym' 'precepm' 'autonomm'
'controlm' 'relatiom' 'eem'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.034 TE(1,1)
VA 0.042 TE(2,2)
VA 0.131 TE(3,3)
VA 0.249 TD(1,1)
VA 0.002 TD(2,2)
VA 0.036 TD(3,3)
VA 0.041 TD(4,4)
VA 0.030 TD(5,5)
VA 0.048 TD(6,6)
VA 0.298 TD(7,7)
VA 0.748 TD(8,8)
VA 0.156 TD(9,9)
VA 5.961 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=588 MA=CM
CM
0.632
0.174 0.372
-0.083 -0.097 0.975
0.260 0.157 -0.070 30.352
0.006 0.018 -0.047 -0.018 0.230
0.152 0.057 0.014 -0.024 0.028 0.763
0.132 0.055 -0.004 0.149 0.014 0.168 0.778
```

```
0.129 0.092 -0.098 0.199 0.005 0.100 0.177 0.573
0.128 0.077 -0.031 0.595 0.010 0.065 0.245 0.172 0.966
0.503 0.301 -0.100 0.117 -0.010 0.441 0.510 0.433 0.390 2.883
1.030 0.664 -0.183 0.139 0.077 0.734 0.661 0.757 0.704 2.557 7.450
0.249 0.172 0.028 0.441 -0.012 0.279 0.186 0.224 0.258 0.963 1.277 1.625
-5.144 -1.902 0.941 -2.911 -0.908 -2.570 -2.023 -1.740 -1.899 -6.623 -13.617 -2.550 122.981
LA
'satisjos' 'qocs' 'apess' 'yrs_unis' 'ftptprs' 'salarys' 'cntineds' 'qualitys' 'preceps' 'autonoms' 'controls'
'relatios' 'ees'
SE
'satisjos' 'qocs' 'apess' 'yrs_unis' 'ftptprs' 'salarys' 'cntineds' 'qualitys' 'preceps' 'autonoms' 'controls'
'relatios' 'ees'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
EQ BE (1,3,2) BE(3,2)
EQ GA(1,1,4) GA(1,4)
EQ GA(1,2,4) GA(2,4)
EQ GA(1,3,4) GA(3,4)
VA 0.032 TE(1,1)
VA 0.037 TE(2,2)
VA 0.195 TE(3,3)
VA 0.304 TD(1,1)
VA 0.002 TD(2,2)
VA 0.038 TD(3,3)
VA 0.039 TD(4,4)
VA 0.029 TD(5,5)
VA 0.048 TD(6,6)
VA 0.288 TD(7,7)
VA 0.745 TD(8,8)
VA 0.163 TD(9,9)
VA 6.149 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=456 MA=CM
CM
0.715
0.201 0.378
-0.033 -0.092 0.741
0.035 0.029 0.121 29.099
-0.051 -0.019 -0.019 0.587 0.250
0.109 0.055 -0.035 0.060 0.055 0.641
0.152 0.117 -0.084 -0.321 0.050 0.078 0.839
0.114 0.100 0.003 0.282 0.036 0.039 0.224 0.603
0.106 0.069 -0.131 0.006 -0.013 0.066 0.158 0.140 0.789
0.450 0.296 -0.232 0.692 -0.024 0.289 0.510 0.367 0.345 2.509
0.911 0.733 -0.262 -1.118 0.015 0.636 1.053 0.544 0.585 2.359 8.212
0.392 0.200 -0.140 -0.143 -0.027 0.160 0.230 0.138 0.255 1.090 1.383 1.696
-3.853 -1.884 0.938 -5.444 -0.758 -2.127 -1.399 -0.954 -0.852 -5.445 -10.968 -3.139 100.803
LA
```

```
'satisjoi' 'qoci' 'apesi' 'yrs_unii' 'ftptpri' 'salaryi' 'cntinedi' 'qualityi' 'precepi' 'autonomi' 'controli' 'relatioi'
'eei'
SE
'satisjoi' 'qoci' 'apesi' 'yrs_unii' 'ftptpri' 'salaryi' 'cntinedi' 'qualityi' 'precepi' 'autonomi' 'controli' 'relatioi'
'eei'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
EQ GA(1,2,5) GA(2,5)
EQ GA(1,3,5) GA(3,5)
VA 0.036 TE(1,1)
VA 0.038 TE(2,2)
VA 0.148 TE(3,3)
VA 0.291 TD(1,1)
VA 0.003 TD(2,2)
VA 0.032 TD(3,3)
VA 0.042 TD(4,4)
VA 0.030 TD(5,5)
VA 0.039 TD(6,6)
VA 0.251 TD(7,7)
VA 0.821 TD(8,8)
VA 0.170 TD(9,9)
VA 5.040 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=290 MA=CM
CM
0.857
0.276 0.537
-0.147 -0.195 1.328
-0.624 -0.183 -1.032 39.582
0.017 0.000 -0.095 0.218 0.237
0.102 0.051 0.057 0.366 0.038 0.837
0.317 0.201 -0.044 -0.015 0.046 0.135 0.887
0.207 0.183 -0.162 0.158 0.039 0.063 0.333 0.647
0.141 0.064 -0.015 0.262 -0.009 0.036 0.232 0.169 0.920
0.627 0.460 -0.068 -0.886 0.069 0.356 0.735 0.567 0.608 3.005
1.123 0.995 -0.274 -1.924 0.094 0.398 1.117 0.951 0.739 2.631 7.114
0.401 0.344 -0.011 -1.604 -0.083 0.217 0.342 0.200 0.196 1.041 1.215 1.893
-6.581 -2.659 1.912 -4.048 -0.816 -2.013 -3.686 -2.357 -1.705 -6.538 -12.871 -2.876 127.829
LA
'satisjoe' 'qoce' 'apese' 'yrs_unie' 'ftptpre' 'salarye' 'cntinede' 'qualitye' 'precepe' 'autonome' 'controle'
'relatioe' 'eee'
SE
'satisjoe' 'qoce' 'apese' 'yrs_unie' 'ftptpre' 'salarye' 'cntinede' 'qualitye' 'precepe' 'autonome' 'controle'
'relatioe' 'eee'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5)LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
```

```
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
 VA 0.043 TE(1,1)
 VA 0.054 TE(2,2)
 VA 0.266 TE(3,3)
 VA 0.396 TD(1,1)
 VA 0.002 TD(2,2)
 VA 0.042 TD(3,3)
 VA 0.044 TD(4,4)
 VA 0.032 TD(5,5)
 VA 0.046 TD(6,6)
 VA 0.300 TD(7,7)
 VA 0.711 TD(8,8)
 VA 0.189 TD(9,9)
 VA 6.391 TD(10,10)
 OU ML ALL AD=OFF ND=3
```

Syntax 6.4 - Four-Group Stacked Model II: Unconstrained (Listwise)

```
Title: Organizational Culture and Adverse Patient Events Stacked Model
DA NI=13 NO=472 MA=CM NG=4 SY
CM
0.648
0.130 0.391
-0.005 -0.050 0.616
0.086 0.228 -0.137 23.950
0.025 0.007 -0.016 -0.041 0.228
0.184 0.035 0.028 0.056 0.019 0.708
0.220 0.084 -0.035 -0.237 0.060 0.195 0.812
0.132 0.100 -0.013 0.272 0.031 0.084 0.233 0.599
0.145 0.070 0.006 0.069 0.030 0.034 0.134 0.140 0.938
0.507 0.283 -0.125 -0.727 0.064 0.376 0.595 0.498 0.297 2.984
0.941 0.634 -0.082 0.347 0.121 0.611 0.933 0.712 0.330 2.692 7.165
0.245 0.181 -0.124 0.029 0.038 0.144 0.221 0.244 0.125 0.927 1.111 1.579
-5.184 -1.698 1.243 0.051 -1.013 -2.063 -2.936 -1.767 -1.666 -8.243 -13.307 -2.955 117.825
LA
'satisjom' 'qocm' 'apesm' 'yrs_unim' 'ftptprm' 'salarym' 'cntinedm' 'qualitym' 'precepm' 'autonomm'
'controlm' 'relatiom' 'eem'
SE
'satisjom' 'qocm' 'apesm' 'yrs_unim' 'ftptprm' 'salarym' 'cntinedm' 'qualitym' 'precepm' 'autonomm'
'controlm' 'relatiom' 'eem'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.032 TE(1,1)
VA 0.039 TE(2,2)
VA 0.123 TE(3,3)
VA 0.240 TD(1,1)
VA 0.002 TD(2,2)
VA 0.035 TD(3,3)
VA 0.041 TD(4,4)
VA 0.030 TD(5,5)
VA 0.047 TD(6,6)
VA 0.298 TD(7,7)
VA 0.717 TD(8,8)
VA 0.158 TD(9,9)
VA 5.891 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=506 MA=CM
CM
0.614
0.177 0.363
-0.084 -0.099 0.930
0.196 0.020 -0.028 29.757
-0.005 0.011 -0.038 -0.003 0.232
0.166 0.079 0.025 0.079 0.034 0.746
0.121 0.048 0.010 0.224 0.011 0.158 0.758
```

```
0.114 0.100 -0.095 0.224 0.002 0.083 0.144 0.548
0.129 0.067 -0.037 0.381 0.020 0.063 0.251 0.156 0.974
0.519 0.315 -0.122 -0.059 -0.015 0.442 0.473 0.416 0.359 2.833
1.070 0.705 -0.180 -0.086 0.054 0.761 0.628 0.695 0.658 2.551 7.593
0.278 0.163 0.027 0.283 -0.020 0.277 0.168 0.194 0.246 0.924 1.246 1.597
-4.895 -1.958 1.208 -0.627 -0.830 -2.430 -1.828 -1.586 -1.748 -6.400 -13.630 -2.374 119.250
LA
'satisjos' 'qocs' 'apess' 'yrs_unis' 'ftptprs' 'salarys' 'cntineds' 'qualitys' 'preceps' 'autonoms' 'controls'
'relatios' 'ees'
SE
'satisjos' 'qocs' 'apess' 'yrs_unis' 'ftptprs' 'salarys' 'cntineds' 'qualitys' 'preceps' 'autonoms' 'controls'
'relatios' 'ees'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.031 TE(1,1)
VA 0.036 TE(2,2)
VA 0.186 TE(3,3)
VA 0.298 TD(1,1)
VA 0.002 TD(2,2)
VA 0.037 TD(3,3)
VA 0.038 TD(4,4)
VA 0.027 TD(5,5)
VA 0.049 TD(6,6)
VA 0.283 TD(7,7)
VA 0.759 TD(8,8)
VA 0.160 TD(9,9)
VA 5.963 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=402 MA=CM
CM
0.725
0.183 0.364
-0.028 -0.088 0.737
0.151 0.141 0.288 28.978
-0.049 -0.011 -0.009 0.489 0.250
0.091 0.055 -0.031 0.094 0.055 0.654
0.155 0.113 -0.091 -0.437 0.048 0.061 0.831
0.090 0.095 0.000 0.294 0.029 0.006 0.196 0.582
0.092 0.074 -0.128 -0.072 -0.018 0.043 0.155 0.129 0.782
0.425 0.273 -0.238 0.558 -0.043 0.264 0.476 0.337 0.300 2.482
0.900 0.726 -0.320 -0.931 0.018 0.618 1.038 0.499 0.619 2.273 8.188
0.364 0.185 -0.155 0.066 -0.012 0.151 0.217 0.104 0.227 1.058 1.297 1.688
-3.581 -1.635 0.860 -7.552 -0.781 -1.951 -1.393 -0.626 -0.769 -5.100 -10.349 -2.842 97.200
LA
'satisjoi' 'qoci' 'apesi' 'yrs_unii' 'ftptpri' 'salaryi' 'cntinedi' 'qualityi' 'precepi' 'autonomi' 'controli' 'relatioi'
'eei'
SE
'satisjoi' 'qoci' 'apesi' 'yrs_unii' 'ftptpri' 'salaryi' 'cntinedi' 'qualityi' 'precepi' 'autonomi' 'controli' 'relatioi'
'eei'
```

```
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.036 TE(1,1)
VA 0.036 TE(2,2)
VA 0.147 TE(3,3)
VA 0.290 TD(1,1)
VA 0.003 TD(2,2)
VA 0.033 TD(3,3)
VA 0.042 TD(4,4)
VA 0.029 TD(5,5)
VA 0.039 TD(6,6)
VA 0.248 TD(7,7)
VA 0.819 TD(8,8)
VA 0.169 TD(9,9)
VA 4.860 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=254 MA=CM
CM
0.859
0.275 0.545
-0.167 -0.216 1.358
-0.527 -0.025 -1.137 36.188
0.008 0.003 -0.107 0.140 0.237
0.096 0.067 0.064 0.215 0.019 0.812
0.303 0.210 -0.051 -0.203 0.037 0.145 0.877
0.187 0.174 -0.187 0.068 0.035 0.071 0.323 0.638
0.133 0.077 -0.014 0.278 -0.012 0.027 0.216 0.205 0.937
0.588 0.431 -0.032 -0.683 0.055 0.324 0.674 0.520 0.617 2.859
1.138 1.016 -0.332 -1.923 0.094 0.421 1.083 0.905 0.773 2.534 7.144
0.435 0.354 0.026 -1.351 -0.075 0.248 0.325 0.223 0.178 0.944 1.203 1.843
-6.485 -2.639 2.191 -3.956 -0.801 -2.080 -3.844 -2.284 -1.876 -6.669 -13.264 -3.021 127.405
LA
'satisjoe' 'qoce' 'apese' 'yrs_unie' 'ftptpre' 'salarye' 'cntinede' 'qualitye' 'precepe' 'autonome' 'controle'
'relatioe' 'eee'
SE
'satisjoe' 'qoce' 'apese' 'yrs_unie' 'ftptpre' 'salarye' 'cntinede' 'qualitye' 'precepe' 'autonome' 'controle'
'relatioe' 'eee'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5)LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.043 TE(1,1)
VA 0.055 TE(2,2)
VA 0.272 TE(3,3)
```

```
VA 0.362 TD(1,1)
VA 0.002 TD(2,2)
VA 0.041 TD(3,3)
VA 0.044 TD(4,4)
VA 0.032 TD(5,5)
VA 0.047 TD(6,6)
VA 0.286 TD(7,7)
VA 0.714 TD(8,8)
VA 0.184 TD(9,9)
VA 6.370 TD(10,10)
OU ML ALL AD=OFF ND=3
```

Syntax 6.5 - Four-Group Stacked Model II: Original (Listwise)

```
Title: Organizational Culture and Adverse Patient Events Stacked Model
DA NI=13 NO=472 MA=CM NG=4 SY
CM
0.648
0.130 0.391
-0.005 -0.050 0.616
0.086 0.228 -0.137 23.950
0.025 0.007 -0.016 -0.041 0.228
0.184 0.035 0.028 0.056 0.019 0.708
0.220 0.084 -0.035 -0.237 0.060 0.195 0.812
0.132 0.100 -0.013 0.272 0.031 0.084 0.233 0.599
0.145 0.070 0.006 0.069 0.030 0.034 0.134 0.140 0.938
0.507 0.283 -0.125 -0.727 0.064 0.376 0.595 0.498 0.297 2.984
0.941 0.634 -0.082 0.347 0.121 0.611 0.933 0.712 0.330 2.692 7.165
0.245 0.181 -0.124 0.029 0.038 0.144 0.221 0.244 0.125 0.927 1.111 1.579
-5.184 -1.698 1.243 0.051 -1.013 -2.063 -2.936 -1.767 -1.666 -8.243 -13.307 -2.955 117.825
LA
'satisjom' 'qocm' 'apesm' 'yrs_unim' 'ftptprm' 'salarym' 'cntinedm' 'qualitym' 'precepm' 'autonomm'
'controlm' 'relatiom' 'eem'
SE
'satisjom' 'qocm' 'apesm' 'yrs_unim' 'ftptprm' 'salarym' 'cntinedm' 'qualitym' 'precepm' 'autonomm'
'controlm' 'relatiom' 'eem'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.032 TE(1,1)
VA 0.039 TE(2,2)
VA 0.123 TE(3,3)
VA 0.240 TD(1,1)
VA 0.002 TD(2,2)
VA 0.035 TD(3,3)
VA 0.041 TD(4,4)
VA 0.030 TD(5,5)
VA 0.047 TD(6,6)
VA 0.298 TD(7,7)
VA 0.717 TD(8,8)
VA 0.158 TD(9,9)
VA 5.891 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=506 MA=CM
CM
0.614
0.177 0.363
-0.084 -0.099 0.930
0.196 0.020 -0.028 29.757
-0.005 0.011 -0.038 -0.003 0.232
0.166 0.079 0.025 0.079 0.034 0.746
0.121 0.048 0.010 0.224 0.011 0.158 0.758
```

```
0.114 0.100 -0.095 0.224 0.002 0.083 0.144 0.548
0.129 0.067 -0.037 0.381 0.020 0.063 0.251 0.156 0.974
0.519 0.315 -0.122 -0.059 -0.015 0.442 0.473 0.416 0.359 2.833
1.070 0.705 -0.180 -0.086 0.054 0.761 0.628 0.695 0.658 2.551 7.593
0.278 0.163 0.027 0.283 -0.020 0.277 0.168 0.194 0.246 0.924 1.246 1.597
-4.895 -1.958 1.208 -0.627 -0.830 -2.430 -1.828 -1.586 -1.748 -6.400 -13.630 -2.374 119.250
LA
'satisjos' 'qocs' 'apess' 'yrs_unis' 'ftptprs' 'salarys' 'cntineds' 'qualitys' 'preceps' 'autonoms' 'controls'
'relatios' 'ees'
SE
'satisjos' 'qocs' 'apess' 'yrs_unis' 'ftptprs' 'salarys' 'cntineds' 'qualitys' 'preceps' 'autonoms' 'controls'
'relatios' 'ees'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
EQ BE (1,3,2) BE(3,2)
EQ GA(1,1,4) GA(1,4)
EQ GA(1,2,4) GA(2,4)
EQ GA(1,3,4) GA(3,4)
VA 0.031 TE(1,1)
VA 0.036 TE(2,2)
VA 0.186 TE(3,3)
VA 0.298 TD(1,1)
VA 0.002 TD(2,2)
VA 0.037 TD(3,3)
VA 0.038 TD(4,4)
VA 0.027 TD(5,5)
VA 0.049 TD(6,6)
VA 0.283 TD(7,7)
VA 0.759 TD(8,8)
VA 0.160 TD(9,9)
VA 5.963 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=402 MA=CM
CM
0.725
0.183 0.364
-0.028 -0.088 0.737
0.151 0.141 0.288 28.978
-0.049 -0.011 -0.009 0.489 0.250
0.091 0.055 -0.031 0.094 0.055 0.654
0.155 0.113 -0.091 -0.437 0.048 0.061 0.831
0.090 0.095 0.000 0.294 0.029 0.006 0.196 0.582
0.092 0.074 -0.128 -0.072 -0.018 0.043 0.155 0.129 0.782
0.425 0.273 -0.238 0.558 -0.043 0.264 0.476 0.337 0.300 2.482
0.900 0.726 -0.320 -0.931 0.018 0.618 1.038 0.499 0.619 2.273 8.188
0.364 0.185 -0.155 0.066 -0.012 0.151 0.217 0.104 0.227 1.058 1.297 1.688
-3.581 -1.635 0.860 -7.552 -0.781 -1.951 -1.393 -0.626 -0.769 -5.100 -10.349 -2.842 97.200
LA
```

```
'satisjoi' 'qoci' 'apesi' 'yrs_unii' 'ftptpri' 'salaryi' 'cntinedi' 'qualityi' 'precepi' 'autonomi' 'controli' 'relatioi'
'eei'
SE
'satisjoi' 'qoci' 'apesi' 'yrs_unii' 'ftptpri' 'salaryi' 'cntinedi' 'qualityi' 'precepi' 'autonomi' 'controli' 'relatioi'
'eei'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
EQ GA(1,2,5) GA(2,5)
EQ GA(1,3,5) GA(3,5)
VA 0.036 TE(1,1)
VA 0.036 TE(2,2)
VA 0.147 TE(3,3)
VA 0.290 TD(1,1)
VA 0.002 TD(2,2)
VA 0.033 TD(3,3)
VA 0.042 TD(4,4)
VA 0.029 TD(5,5)
VA 0.039 TD(6,6)
VA 0.248 TD(7,7)
VA 0.819 TD(8,8)
VA 0.169 TD(9,9)
VA 4.860 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=254 MA=CM
CM
0.859
0.275 0.545
-0.167 -0.216 1.358
-0.527 -0.025 -1.137 36.188
0.008 0.003 -0.107 0.140 0.237
0.096 0.067 0.064 0.215 0.019 0.812
0.303 0.210 -0.051 -0.203 0.037 0.145 0.877
0.187 0.174 -0.187 0.068 0.035 0.071 0.323 0.638
0.133 0.077 -0.014 0.278 -0.012 0.027 0.216 0.205 0.937
0.588 0.431 -0.032 -0.683 0.055 0.324 0.674 0.520 0.617 2.859
1.138 1.016 -0.332 -1.923 0.094 0.421 1.083 0.905 0.773 2.534 7.144
0.435 0.354 0.026 -1.351 -0.075 0.248 0.325 0.223 0.178 0.944 1.203 1.843
-6.485 -2.639 2.191 -3.956 -0.801 -2.080 -3.844 -2.284 -1.876 -6.669 -13.264 -3.021 127.405
LA
'satisjoe' 'qoce' 'apese' 'yrs_unie' 'ftptpre' 'salarye' 'cntinede' 'qualitye' 'precepe' 'autonome' 'controle'
'relatioe' 'eee'
SE
'satisjoe' 'qoce' 'apese' 'yrs_unie' 'ftptpre' 'salarye' 'cntinede' 'qualitye' 'precepe' 'autonome' 'controle'
'relatioe' 'eee'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5)LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
```

```
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.043 TE(1,1)
VA 0.055 TE(2,2)
VA 0.272 TE(3,3)
VA 0.362 TD(1,1)
VA 0.002 TD(2,2)
VA 0.041 TD(3,3)
VA 0.044 TD(4,4)
VA 0.032 TD(5,5)
VA 0.047 TD(6,6)
VA 0.286 TD(7,7)
VA 0.714 TD(8,8)
VA 0.184 TD(9,9)
VA 6.370 TD(10,10)
OU ML ALL AD=OFF ND=3
```

Syntax 6.6 – Four-Group Stacked Model II: Final (Listwise)

```
Title: Organizational Culture and Adverse Patient Events Stacked Model
DA NI=13 NO=472 MA=CM NG=4 SY
CM
0.648
0.130 0.391
-0.005 -0.050 0.616
0.086 0.228 -0.137 23.950
0.025 0.007 -0.016 -0.041 0.228
0.184 0.035 0.028 0.056 0.019 0.708
0.220 0.084 -0.035 -0.237 0.060 0.195 0.812
0.132 0.100 -0.013 0.272 0.031 0.084 0.233 0.599
0.145 0.070 0.006 0.069 0.030 0.034 0.134 0.140 0.938
0.507 0.283 -0.125 -0.727 0.064 0.376 0.595 0.498 0.297 2.984
0.941 0.634 -0.082 0.347 0.121 0.611 0.933 0.712 0.330 2.692 7.165
0.245 0.181 -0.124 0.029 0.038 0.144 0.221 0.244 0.125 0.927 1.111 1.579
-5.184 -1.698 1.243 0.051 -1.013 -2.063 -2.936 -1.767 -1.666 -8.243 -13.307 -2.955 117.825
LA
'satisjom' 'qocm' 'apesm' 'yrs_unim' 'ftptprm' 'salarym' 'cntinedm' 'qualitym' 'precepm' 'autonomm'
'controlm' 'relatiom' 'eem'
SE
'satisjom' 'qocm' 'apesm' 'yrs_unim' 'ftptprm' 'salarym' 'cntinedm' 'qualitym' 'precepm' 'autonomm'
'controlm' 'relatiom' 'eem'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI                      GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.032 TE(1,1)
VA 0.039 TE(2,2)
VA 0.123 TE(3,3)
VA 0.240 TD(1,1)
VA 0.002 TD(2,2)
VA 0.035 TD(3,3)
VA 0.041 TD(4,4)
VA 0.030 TD(5,5)
VA 0.047 TD(6,6)
VA 0.298 TD(7,7)
VA 0.717 TD(8,8)
VA 0.158 TD(9,9)
VA 5.891 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=506 MA=CM
CM
0.614
0.177 0.363
-0.084 -0.099 0.930
0.196 0.020 -0.028 29.757
-0.005 0.011 -0.038 -0.003 0.232
0.166 0.079 0.025 0.079 0.034 0.746
0.121 0.048 0.010 0.224 0.011 0.158 0.758
```

```
0.114 0.100 -0.095 0.224 0.002 0.083 0.144 0.548
0.129 0.067 -0.037 0.381 0.020 0.063 0.251 0.156 0.974
0.519 0.315 -0.122 -0.059 -0.015 0.442 0.473 0.416 0.359 2.833
1.070 0.705 -0.180 -0.086 0.054 0.761 0.628 0.695 0.658 2.551 7.593
0.278 0.163 0.027 0.283 -0.020 0.277 0.168 0.194 0.246 0.924 1.246 1.597
-4.895 -1.958 1.208 -0.627 -0.830 -2.430 -1.828 -1.586 -1.748 -6.400 -13.630 -2.374 119.250
LA
'satisjos' 'qocs' 'apess' 'yrs_unis' 'ftptprs' 'salarys' 'cntineds' 'qualitys' 'preceps' 'autonoms' 'controls'
'relatios' 'ees'
SE
'satisjos' 'qocs' 'apess' 'yrs_unis' 'ftptprs' 'salarys' 'cntineds' 'qualitys' 'preceps' 'autonoms' 'controls'
'relatios' 'ees'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
EQ BE (1,3,2) BE(3,2)
EQ GA(1,1,4) GA(1,4)
EQ GA(1,2,4) GA(2,4)
EQ GA(1,3,4) GA(3,4)
VA 0.031 TE(1,1)
VA 0.036 TE(2,2)
VA 0.186 TE(3,3)
VA 0.298 TD(1,1)
VA 0.002 TD(2,2)
VA 0.037 TD(3,3)
VA 0.038 TD(4,4)
VA 0.027 TD(5,5)
VA 0.049 TD(6,6)
VA 0.283 TD(7,7)
VA 0.759 TD(8,8)
VA 0.160 TD(9,9)
VA 5.963 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=402 MA=CM
CM
0.725
0.183 0.364
-0.028 -0.088 0.737
0.151 0.141 0.288 28.978
-0.049 -0.011 -0.009 0.489 0.250
0.091 0.055 -0.031 0.094 0.055 0.654
0.155 0.113 -0.091 -0.437 0.048 0.061 0.831
0.090 0.095 0.000 0.294 0.029 0.006 0.196 0.582
0.092 0.074 -0.128 -0.072 -0.018 0.043 0.155 0.129 0.782
0.425 0.273 -0.238 0.558 -0.043 0.264 0.476 0.337 0.300 2.482
0.900 0.726 -0.320 -0.931 0.018 0.618 1.038 0.499 0.619 2.273 8.188
0.364 0.185 -0.155 0.066 -0.012 0.151 0.217 0.104 0.227 1.058 1.297 1.688
-3.581 -1.635 0.860 -7.552 -0.781 -1.951 -1.393 -0.626 -0.769 -5.100 -10.349 -2.842 97.200
LA
```

```
'satisjoi' 'qoci' 'apesi' 'yrs_unii' 'ftptpri' 'salaryi' 'cntinedi' 'qualityi' 'precepi' 'autonomi' 'controli' 'relatioi'
'eei'
SE
'satisjoi' 'qoci' 'apesi' 'yrs_unii' 'ftptpri' 'salaryi' 'cntinedi' 'qualityi' 'precepi' 'autonomi' 'controli' 'relatioi'
'eei'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
EQ GA(1,2,5) GA(2,5)
EQ GA(1,3,5) GA(3,5)
VA 0.036 TE(1,1)
VA 0.036 TE(2,2)
VA 0.147 TE(3,3)
VA 0.290 TD(1,1)
VA 0.002 TD(2,2)
VA 0.033 TD(3,3)
VA 0.042 TD(4,4)
VA 0.029 TD(5,5)
VA 0.039 TD(6,6)
VA 0.248 TD(7,7)
VA 0.819 TD(8,8)
VA 0.169 TD(9,9)
VA 4.860 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=254 MA=CM
CM
0.859
0.275 0.545
-0.167 -0.216 1.358
-0.527 -0.025 -1.137 36.188
0.008 0.003 -0.107 0.140 0.237
0.096 0.067 0.064 0.215 0.019 0.812
0.303 0.210 -0.051 -0.203 0.037 0.145 0.877
0.187 0.174 -0.187 0.068 0.035 0.071 0.323 0.638
0.133 0.077 -0.014 0.278 -0.012 0.027 0.216 0.205 0.937
0.588 0.431 -0.032 -0.683 0.055 0.324 0.674 0.520 0.617 2.859
1.138 1.016 -0.332 -1.923 0.094 0.421 1.083 0.905 0.773 2.534 7.144
0.435 0.354 0.026 -1.351 -0.075 0.248 0.325 0.223 0.178 0.944 1.203 1.843
-6.485 -2.639 2.191 -3.956 -0.801 -2.080 -3.844 -2.284 -1.876 -6.669 -13.264 -3.021 127.405
LA
'satisjoe' 'qoce' 'apese' 'yrs_unie' 'ftptpre' 'salarye' 'cntinede' 'qualitye' 'precepe' 'autonome' 'controle'
'relatioe' 'eee'
SE
'satisjoe' 'qoce' 'apese' 'yrs_unie' 'ftptpre' 'salarye' 'cntinede' 'qualitye' 'precepe' 'autonome' 'controle'
'relatioe' 'eee'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5)LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
```

```
LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
VA 0.043 TE(1,1)
VA 0.055 TE(2,2)
VA 0.272 TE(3,3)
VA 0.362 TD(1,1)
VA 0.002 TD(2,2)
VA 0.041 TD(3,3)
VA 0.044 TD(4,4)
VA 0.032 TD(5,5)
VA 0.047 TD(6,6)
VA 0.286 TD(7,7)
VA 0.714 TD(8,8)
VA 0.184 TD(9,9)
VA 6.370 TD(10,10)
OU ML ALL AD=OFF ND=3
```

Representative Examples of Syntax in Sensitivity Analyses

Syntax 5.9 - Model I: Final (Pairwise, Split1, half error)

```
Title: Organizational Culture and Adverse Patient Events: C:\Desktop\Dissertation\AB-Split1
DA NI=16 NO=971 MA=CM SY
CM
0.690
0.172 0.403
-0.061 -0.082 0.924
-0.019 0.007 -0.291 30.240
-0.002 0.005 -0.023 0.036 0.242
0.156 0.070 0.009 0.018 0.044 0.697
0.174 0.092 -0.035 -0.063 0.037 0.148 0.809
0.150 0.121 -0.069 0.185 0.028 0.077 0.244 0.598
0.152 0.103 -0.049 0.168 -0.002 0.009 0.180 0.143 0.915
0.508 0.331 -0.117 -0.204 0.042 0.391 0.528 0.473 0.385 2.813
0.992 0.838 -0.125 -0.852 0.075 0.733 0.902 0.814 0.669 2.744 8.076
0.322 0.226 -0.118 0.076 -0.023 0.203 0.271 0.224 0.241 0.926 1.355 1.717
-5.318 -2.252 1.005 -3.008 -0.805 -2.555 -2.329 -2.090 -2.193 -7.465 -15.148 -3.786 121.245
-0.005 -0.010 0.032 0.072 0.017 0.008 0.017 0.009 -0.017 -0.016 0.007 -0.080 -0.038 0.218
0.055 0.065 -0.062 0.050 -0.026 0.021 -0.013 0.011 0.063 0.085 0.214 0.095 -0.900 -0.075 0.178
-0.021 -0.035 -0.043 0.171 0.001 -0.031 0.019 -0.008 0.004 -0.064 -0.176 0.053 0.525 -0.049 -0.036
0.130
LA
'satisjob' 'qoc' 'apes' 'yrs_unit' 'ftptpr' 'salary' 'cntined' 'quality' 'precep' 'autonomy' 'controlo' 'relation' 'ee'
'dsurg' 'dicu' 'der'
SE
'satisjob' 'qoc' 'apes' 'yrs_unit' 'ftptpr' 'salary' 'cntined' 'quality' 'precep' 'autonomy' 'controlo' 'relation' 'ee'
'dsurg' 'dicu' 'der'
MO NY=3 NX=13 NE=3 NK=13 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10) LX(11,11) LX(12,12) LX(13,13)
FR BE(2,1) BE(3,1) BE(3,2)
FI  GA(1,5) GA(3,3)
FR PS(1,1) PS(2,2) PS(3,3)
VA                          0.017 TE(1,1)
VA 0.040 TE(2,2)
VA 0.185 TE(3,3)
VA 0.302 TD(1,1)
VA 0.002 TD(2,2)
VA 0.035 TD(3,3)
VA 0.040 TD(4,4)
VA 0.030 TD(5,5)
VA 0.046 TD(6,6)
VA 0.281 TD(7,7)
VA 0.808 TD(8,8)
VA 0.172 TD(9,9)
VA  6.062 TD(10,10)
VA 0.002 TD(11,11)
VA 0.002 TD(12,12)
VA 0.001 TD(13,13)
OU ML ALL AD=OFF ND=3
```

Syntax 5.10 - Model I: Final (Pairwise, Split1, double error)

```
Title: Organizational Culture and Adverse Patient Events: C:\Desktop\Dissertation\AB-Split1
DA NI=16 NO=971 MA=CM SY
CM
0.690
0.172 0.403
-0.061 -0.082 0.924
-0.019 0.007 -0.291 30.240
-0.002 0.005 -0.023 0.036 0.242
0.156 0.070 0.009 0.018 0.044 0.697
0.174 0.092 -0.035 -0.063 0.037 0.148 0.809
0.150 0.121 -0.069 0.185 0.028 0.077 0.244 0.598
0.152 0.103 -0.049 0.168 -0.002 0.009 0.180 0.143 0.915
0.508 0.331 -0.117 -0.204 0.042 0.391 0.528 0.473 0.385 2.813
0.992 0.838 -0.125 -0.852 0.075 0.733 0.902 0.814 0.669 2.744 8.076
0.322 0.226 -0.118 0.076 -0.023 0.203 0.271 0.224 0.241 0.926 1.355 1.717
-5.318 -2.252 1.005 -3.008 -0.805 -2.555 -2.329 -2.090 -2.193 -7.465 -15.148 -3.786 121.245
-0.005 -0.010 0.032 0.072 0.017 0.008 0.017 0.009 -0.017 -0.016 0.007 -0.080 -0.038 0.218
0.055 0.065 -0.062 0.050 -0.026 0.021 -0.013 0.011 0.063 0.085 0.214 0.095 -0.900 -0.075 0.178
-0.021 -0.035 -0.043 0.171 0.001 -0.031 0.019 -0.008 0.004 -0.064 -0.176 0.053 0.525 -0.049 -0.036
0.130
LA
'satisjob' 'qoc' 'apes' 'yrs_unit' 'ftptpr' 'salary' 'cntined' 'quality' 'precep' 'autonomy' 'controlo' 'relation' 'ee'
'dsurg' 'dicu' 'der'
SE
'satisjob' 'qoc' 'apes' 'yrs_unit' 'ftptpr' 'salary' 'cntined' 'quality' 'precep' 'autonomy' 'controlo' 'relation' 'ee'
'dsurg' 'dicu' 'der'
MO NY=3 NX=13 NE=3 NK=13 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10) LX(11,11) LX(12,12) LX(13,13)
FR BE(2,1) BE(3,1) BE(3,2)
FI  GA(1,5) GA(3,3)
FR PS(1,1) PS(2,2) PS(3,3)
VA                          0.069 TE(1,1)
VA 0.040 TE(2,2)
VA 0.185 TE(3,3)
VA 0.302 TD(1,1)
VA 0.002 TD(2,2)
VA 0.035 TD(3,3)
VA 0.040 TD(4,4)
VA 0.030 TD(5,5)
VA 0.046 TD(6,6)
VA 0.281 TD(7,7)
VA 0.808 TD(8,8)
VA 0.172 TD(9,9)
VA  6.062 TD(10,10)
VA 0.002 TD(11,11)
VA 0.002 TD(12,12)
VA 0.001 TD(13,13)
OU ML ALL AD=OFF ND=3
```

Syntax 6.7 - Four-Group Stacked Model II: Final (Pairwise, half error)

```
Title: Organizational Culture and Adverse Patient Events Stacked Model
DA NI=13 NO=544 MA=CM NG=4 SY
CM
0.686
0.134 0.416
-0.020 -0.052 0.657
0.001 0.175 -0.322 24.929
0.021 0.017 -0.013 -0.077 0.229
0.163 0.019 0.038 -0.067 0.034 0.722
0.210 0.086 -0.056 -0.282 0.059 0.177 0.826
0.143 0.109 -0.018 0.178 0.037 0.073 0.218 0.609
0.154 0.086 -0.009 -0.015 0.038 0.045 0.158 0.157 0.956
0.511 0.321 -0.171 -0.849 0.077 0.351 0.587 0.491 0.320 2.982
0.931 0.696 -0.135 -0.060 0.146 0.606 0.897 0.678 0.446 2.718 7.476
0.259 0.201 -0.137 0.050 0.044 0.143 0.226 0.216 0.164 0.897 1.184 1.564
-5.403 -1.824 1.320 1.500 -1.002 -2.184 -2.767 -1.873 -1.874 -8.383 -14.612 -3.293 119.214
LA
'satisjom' 'qocm' 'apesm' 'yrs_unim' 'ftptprm' 'salarym' 'cntinedm' 'qualitym' 'precepm' 'autonomm'
'controlm' 'relatiom' 'eem'
SE
'satisjom' 'qocm' 'apesm' 'yrs_unim' 'ftptprm' 'salarym' 'cntinedm' 'qualitym' 'precepm' 'autonomm'
'controlm' 'relatiom' 'eem'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
VA                          0.017 TE(1,1)
VA 0.042 TE(2,2)
VA 0.131 TE(3,3)
VA 0.249 TD(1,1)
VA 0.002 TD(2,2)
VA 0.036 TD(3,3)
VA 0.041 TD(4,4)
VA 0.030 TD(5,5)
VA 0.048 TD(6,6)
VA 0.298 TD(7,7)
VA 0.748 TD(8,8)
VA 0.156 TD(9,9)
VA 5.961 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=588 MA=CM
CM
0.632
0.174 0.372
-0.083 -0.097 0.975
0.260 0.157 -0.070 30.352
0.006 0.018 -0.047 -0.018 0.230
0.152 0.057 0.014 -0.024 0.028 0.763
0.132 0.055 -0.004 0.149 0.014 0.168 0.778
```

```
0.129 0.092 -0.098 0.199 0.005 0.100 0.177 0.573
0.128 0.077 -0.031 0.595 0.010 0.065 0.245 0.172 0.966
0.503 0.301 -0.100 0.117 -0.010 0.441 0.510 0.433 0.390 2.883
1.030 0.664 -0.183 0.139 0.077 0.734 0.661 0.757 0.704 2.557 7.450
0.249 0.172 0.028 0.441 -0.012 0.279 0.186 0.224 0.258 0.963 1.277 1.625
-5.144 -1.902 0.941 -2.911 -0.908 -2.570 -2.023 -1.740 -1.899 -6.623 -13.617 -2.550 122.981
LA
'satisjos' 'qocs' 'apess' 'yrs_unis' 'ftptprs' 'salarys' 'cntineds' 'qualitys' 'preceps' 'autonoms' 'controls'
'relatios' 'ees'
SE
'satisjos' 'qocs' 'apess' 'yrs_unis' 'ftptprs' 'salarys' 'cntineds' 'qualitys' 'preceps' 'autonoms' 'controls'
'relatios' 'ees'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
EQ BE (1,3,2) BE(3,2)
EQ GA(1,1,4) GA(1,4)
EQ GA(1,2,4) GA(2,4)
EQ GA(1,3,4) GA(3,4)
VA                    0.016 TE(1,1)
VA 0.037 TE(2,2)
VA 0.195 TE(3,3)
VA 0.304 TD(1,1)
VA 0.002 TD(2,2)
VA 0.038 TD(3,3)
VA 0.039 TD(4,4)
VA 0.029 TD(5,5)
VA 0.048 TD(6,6)
VA 0.288 TD(7,7)
VA 0.745 TD(8,8)
VA 0.163 TD(9,9)
VA 6.149 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=456 MA=CM
CM
0.715
0.201 0.378
-0.033 -0.092 0.741
0.035 0.029 0.121 29.099
-0.051 -0.019 -0.019 0.587 0.250
0.109 0.055 -0.035 0.060 0.055 0.641
0.152 0.117 -0.084 -0.321 0.050 0.078 0.839
0.114 0.100 0.003 0.282 0.036 0.039 0.224 0.603
0.106 0.069 -0.131 0.006 -0.013 0.066 0.158 0.140 0.789
0.450 0.296 -0.232 0.692 -0.024 0.289 0.510 0.367 0.345 2.509
0.911 0.733 -0.262 -1.118 0.015 0.636 1.053 0.544 0.585 2.359 8.212
0.392 0.200 -0.140 -0.143 -0.027 0.160 0.230 0.138 0.255 1.090 1.383 1.696
-3.853 -1.884 0.938 -5.444 -0.758 -2.127 -1.399 -0.954 -0.852 -5.445 -10.968 -3.139 100.803
LA
```

```
'satisjoi' 'qoci' 'apesi' 'yrs_unii' 'ftptpri' 'salaryi' 'cntinedi' 'qualityi' 'precepi' 'autonomi' 'controli' 'relatioi'
'eei'
SE
'satisjoi' 'qoci' 'apesi' 'yrs_unii' 'ftptpri' 'salaryi' 'cntinedi' 'qualityi' 'precepi' 'autonomi' 'controli' 'relatioi'
'eei'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
EQ GA(1,2,5) GA(2,5)
EQ GA(1,3,5) GA(3,5)
VA                    0.018 TE(1,1)
VA 0.038 TE(2,2)
VA 0.148 TE(3,3)
VA 0.291 TD(1,1)
VA 0.003 TD(2,2)
VA 0.032 TD(3,3)
VA 0.042 TD(4,4)
VA 0.030 TD(5,5)
VA 0.039 TD(6,6)
VA 0.251 TD(7,7)
VA 0.821 TD(8,8)
VA 0.170 TD(9,9)
VA 5.040 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=290 MA=CM
CM
0.857
0.276 0.537
-0.147 -0.195 1.328
-0.624 -0.183 -1.032 39.582
0.017 0.000 -0.095 0.218 0.237
0.102 0.051 0.057 0.366 0.038 0.837
0.317 0.201 -0.044 -0.015 0.046 0.135 0.887
0.207 0.183 -0.162 0.158 0.039 0.063 0.333 0.647
0.141 0.064 -0.015 0.262 -0.009 0.036 0.232 0.169 0.920
0.627 0.460 -0.068 -0.886 0.069 0.356 0.735 0.567 0.608 3.005
1.123 0.995 -0.274 -1.924 0.094 0.398 1.117 0.951 0.739 2.631 7.114
0.401 0.344 -0.011 -1.604 -0.083 0.217 0.342 0.200 0.196 1.041 1.215 1.893
-6.581 -2.659 1.912 -4.048 -0.816 -2.013 -3.686 -2.357 -1.705 -6.538 -12.871 -2.876 127.829
LA
'satisjoe' 'qoce' 'apese' 'yrs_unie' 'ftptpre' 'salarye' 'cntinede' 'qualitye' 'precepe' 'autonome' 'controle'
'relatioe' 'eee'
SE
'satisjoe' 'qoce' 'apese' 'yrs_unie' 'ftptpre' 'salarye' 'cntinede' 'qualitye' 'precepe' 'autonome' 'controle'
'relatioe' 'eee'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5)LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
```

```
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
VA                          0.021 TE(1,1)
VA 0.054 TE(2,2)
VA 0.266 TE(3,3)
VA 0.396 TD(1,1)
VA 0.002 TD(2,2)
VA 0.042 TD(3,3)
VA 0.044 TD(4,4)
VA 0.032 TD(5,5)
VA 0.046 TD(6,6)
VA 0.300 TD(7,7)
VA 0.711 TD(8,8)
VA 0.189 TD(9,9)
VA 6.391 TD(10,10)
OU ML ALL AD=OFF ND=3
```

Syntax 6.8 - Four-Group Stacked Model II: Final (Pairwise, double error)

```
Title: Organizational Culture and Adverse Patient Events Stacked Model
DA NI=13 NO=544 MA=CM NG=4 SY
CM
0.686
0.134 0.416
-0.020 -0.052 0.657
0.001 0.175 -0.322 24.929
0.021 0.017 -0.013 -0.077 0.229
0.163 0.019 0.038 -0.067 0.034 0.722
0.210 0.086 -0.056 -0.282 0.059 0.177 0.826
0.143 0.109 -0.018 0.178 0.037 0.073 0.218 0.609
0.154 0.086 -0.009 -0.015 0.038 0.045 0.158 0.157 0.956
0.511 0.321 -0.171 -0.849 0.077 0.351 0.587 0.491 0.320 2.982
0.931 0.696 -0.135 -0.060 0.146 0.606 0.897 0.678 0.446 2.718 7.476
0.259 0.201 -0.137 0.050 0.044 0.143 0.226 0.216 0.164 0.897 1.184 1.564
-5.403 -1.824 1.320 1.500 -1.002 -2.184 -2.767 -1.873 -1.874 -8.383 -14.612 -3.293 119.214
LA
'satisjom' 'qocm' 'apesm' 'yrs_unim' 'ftptprm' 'salarym' 'cntinedm' 'qualitym' 'precepm' 'autonomm'
'controlm' 'relatiom' 'eem'
SE
'satisjom' 'qocm' 'apesm' 'yrs_unim' 'ftptprm' 'salarym' 'cntinedm' 'qualitym' 'precepm' 'autonomm'
'controlm' 'relatiom' 'eem'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
VA                          0.069 TE(1,1)
VA 0.042 TE(2,2)
VA 0.131 TE(3,3)
VA 0.249 TD(1,1)
VA 0.002 TD(2,2)
VA 0.036 TD(3,3)
VA 0.041 TD(4,4)
VA 0.030 TD(5,5)
VA 0.048 TD(6,6)
VA 0.298 TD(7,7)
VA 0.748 TD(8,8)
VA 0.156 TD(9,9)
VA 5.961 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=588 MA=CM
CM
0.632
0.174 0.372
-0.083 -0.097 0.975
0.260 0.157 -0.070 30.352
0.006 0.018 -0.047 -0.018 0.230
0.152 0.057 0.014 -0.024 0.028 0.763
0.132 0.055 -0.004 0.149 0.014 0.168 0.778
```

```
0.129 0.092 -0.098 0.199 0.005 0.100 0.177 0.573
0.128 0.077 -0.031 0.595 0.010 0.065 0.245 0.172 0.966
0.503 0.301 -0.100 0.117 -0.010 0.441 0.510 0.433 0.390 2.883
1.030 0.664 -0.183 0.139 0.077 0.734 0.661 0.757 0.704 2.557 7.450
0.249 0.172 0.028 0.441 -0.012 0.279 0.186 0.224 0.258 0.963 1.277 1.625
-5.144 -1.902 0.941 -2.911 -0.908 -2.570 -2.023 -1.740 -1.899 -6.623 -13.617 -2.550 122.981
LA
'satisjos' 'qocs' 'apess' 'yrs_unis' 'ftptprs' 'salarys' 'cntineds' 'qualitys' 'preceps' 'autonoms' 'controls'
'relatios' 'ees'
SE
'satisjos' 'qocs' 'apess' 'yrs_unis' 'ftptprs' 'salarys' 'cntineds' 'qualitys' 'preceps' 'autonoms' 'controls'
'relatios' 'ees'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
EQ BE (1,3,2) BE(3,2)
EQ GA(1,1,4) GA(1,4)
EQ GA(1,2,4) GA(2,4)
EQ GA(1,3,4) GA(3,4)
VA                    0.063 TE(1,1)
VA 0.037 TE(2,2)
VA 0.195 TE(3,3)
VA 0.304 TD(1,1)
VA 0.002 TD(2,2)
VA 0.038 TD(3,3)
VA 0.039 TD(4,4)
VA 0.029 TD(5,5)
VA 0.048 TD(6,6)
VA 0.288 TD(7,7)
VA 0.745 TD(8,8)
VA 0.163 TD(9,9)
VA 6.149 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=456 MA=CM
CM
0.715
0.201 0.378
-0.033 -0.092 0.741
0.035 0.029 0.121 29.099
-0.051 -0.019 -0.019 0.587 0.250
0.109 0.055 -0.035 0.060 0.055 0.641
0.152 0.117 -0.084 -0.321 0.050 0.078 0.839
0.114 0.100 0.003 0.282 0.036 0.039 0.224 0.603
0.106 0.069 -0.131 0.006 -0.013 0.066 0.158 0.140 0.789
0.450 0.296 -0.232 0.692 -0.024 0.289 0.510 0.367 0.345 2.509
0.911 0.733 -0.262 -1.118 0.015 0.636 1.053 0.544 0.585 2.359 8.212
0.392 0.200 -0.140 -0.143 -0.027 0.160 0.230 0.138 0.255 1.090 1.383 1.696
-3.853 -1.884 0.938 -5.444 -0.758 -2.127 -1.399 -0.954 -0.852 -5.445 -10.968 -3.139 100.803
LA
```

```
'satisjoi' 'qoci' 'apesi' 'yrs_unii' 'ftptpri' 'salaryi' 'cntinedi' 'qualityi' 'precepi' 'autonomi' 'controli' 'relatioi'
'eei'
SE
'satisjoi' 'qoci' 'apesi' 'yrs_unii' 'ftptpri' 'salaryi' 'cntinedi' 'qualityi' 'precepi' 'autonomi' 'controli' 'relatioi'
'eei'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5) LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
EQ GA(1,2,5) GA(2,5)
EQ GA(1,3,5) GA(3,5)
VA                    0.071 TE(1,1)
VA 0.038 TE(2,2)
VA 0.148 TE(3,3)
VA 0.291 TD(1,1)
VA 0.003 TD(2,2)
VA 0.032 TD(3,3)
VA 0.042 TD(4,4)
VA 0.030 TD(5,5)
VA 0.039 TD(6,6)
VA 0.251 TD(7,7)
VA 0.821 TD(8,8)
VA 0.170 TD(9,9)
VA 5.040 TD(10,10)
OU ML ALL AD=OFF ND=3

DA NI=13 NO=290 MA=CM
CM
0.857
0.276 0.537
-0.147 -0.195 1.328
-0.624 -0.183 -1.032 39.582
0.017 0.000 -0.095 0.218 0.237
0.102 0.051 0.057 0.366 0.038 0.837
0.317 0.201 -0.044 -0.015 0.046 0.135 0.887
0.207 0.183 -0.162 0.158 0.039 0.063 0.333 0.647
0.141 0.064 -0.015 0.262 -0.009 0.036 0.232 0.169 0.920
0.627 0.460 -0.068 -0.886 0.069 0.356 0.735 0.567 0.608 3.005
1.123 0.995 -0.274 -1.924 0.094 0.398 1.117 0.951 0.739 2.631 7.114
0.401 0.344 -0.011 -1.604 -0.083 0.217 0.342 0.200 0.196 1.041 1.215 1.893
-6.581 -2.659 1.912 -4.048 -0.816 -2.013 -3.686 -2.357 -1.705 -6.538 -12.871 -2.876 127.829
LA
'satisjoe' 'qoce' 'apese' 'yrs_unie' 'ftptpre' 'salarye' 'cntinede' 'qualitye' 'precepe' 'autonome' 'controle'
'relatioe' 'eee'
SE
'satisjoe' 'qoce' 'apese' 'yrs_unie' 'ftptpre' 'salarye' 'cntinede' 'qualitye' 'precepe' 'autonome' 'controle'
'relatioe' 'eee'
MO NY=3 NX=10 NE=3 NK=10 LY=DI,FI LX=DI,FI BE=FU,FI GA=FU,FR PH=FU,FR PS=DI,FI
C
 TE=DI,FI TD=DI,FI
VA 1.0 LY(1,1) LY(2,2) LY(3,3)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4) LX(5,5)LX(6,6) LX(7,7) LX(8,8) LX(9,9) C
```

```
 LX(10,10)
FR BE(2,1) BE(3,1) BE(3,2)
FI GA(2,3) GA(3,3) GA(1,5)
FR PS(1,1) PS(2,2) PS(3,3)
VA                          0.086 TE(1,1)
VA 0.054 TE(2,2)
VA 0.266 TE(3,3)
VA 0.396 TD(1,1)
VA 0.002 TD(2,2)
VA 0.042 TD(3,3)
VA 0.044 TD(4,4)
VA 0.032 TD(5,5)
VA 0.046 TD(6,6)
VA 0.300 TD(7,7)
VA 0.711 TD(8,8)
VA 0.189 TD(9,9)
VA 6.391 TD(10,10)
OU ML ALL AD=OFF ND=3
```